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MARINE CORPS CONTRACT SUPPLY MODEL FOR HIGH QUALITY MALE ENLISTMENT CONTRACTS AT THE RECRUITING SUB STATION LEVEL

by

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March 2008

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MARINE CORPS CONTRACT SUPPLY MODEL FOR HIGH QUALITY MALE ENLISTMENT CONTRACTS AT THE RECRUITING SUB STATION LEVEL

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I. INTRODUCTION

A. BACKGROUND

On June 5, 2007, the Marine Corps received Congressional approval to increase end strength by 9,000 Marines for fiscal year 2008. An annual incremental increase will continue until fiscal year 2011 when total end strength for the Marine Corps will reach 202,000, as compared to the current 2007 level of 175,000. This increase has made forecasting accessions an even more vital part of manpower planning. In order to successfully plan accessions to build the force the Marine Corps must be able to, as accurately as possible, predict not only general enlistment contract numbers but also the high quality male enlistment contracts that will fill technical enlisted positions within the Marine Corps.

End strength is the total number of personnel within a service, and is calculated as the personnel at the beginning of the fiscal year minus the losses plus gains that are recalculated at the end of the fiscal year. Maximum end strength is mandated by Congress, and any excess of the approved end strength at the end of a fiscal year is identified as an overage. There are only two circumstances where end strength overages are tolerated. The Secretary of the Navy (SECNAV) must authorize a two percent overage, and the Secretary of Defense (SECDEF) must approve a three percent overage. There is no authorized number for falling under end strength. However, not accurately forecasting the recruitment of high quality male enlistments may lead to

recruiting, and thus manning, shortages in technical enlisted occupations, which could bring on operational consequences.

The accurate forecasting of contracts has an impact on the Marine Corps' annual budget. As of 2004 manpower cost was around $9.4 billion, about 60% of the Marine Corps' annual budget (MARINE CORPS END STRENGTH INCREASE, 2007). A failure to accurately forecast contracts has a cascading effect on the budgeted funding for manpower. And because the budget is a constraint, it is very important that monthly forecasted contract rates be as close as possible to the actual contract rates.

B. PURPOSE

The purpose of this research is to develop a model for forecasting the supply of high quality male applicants at the Recruiting Sub Station (RSS) level for the Marine Corps. Due to the rising accession missions and increasing recruiter levels it is necessary to be able to accurately predict the supply of high quality applicant contracts. With the increase in maximum end strength over the next three years, forecasting which local market areas are likely to generate high quality male applicants and enlistment contracts will allow for the appropriate allocation of recruiting resources to be applied to local markets that yield the most high quality male contracts. This research proposes to develop a model that will be used to forecast high quality male contracts based on local area characteristics that are significant predictors of enlistment propensity.

C. SCOPE AND METHODOLOGY

While conducting research for this thesis, determining what factors are predictive of high quality male contracts within the Marine Corps was identified as a primary focus of study. In order to address this question, enlistment supply studies from the 1980's through 2005 relating to all branches of service were reviewed. Although earlier studies are no longer current, many of the variables that were determined to affect the propensity to enlist may still predict enlistments today.

The resulting scope of this thesis covers three distinct areas. First, a review of previous enlistment supply studies done on other services is conducted. Second, the current forecasting methods used within the Marine Corps and Navy will be reviewed. Third, the study will specify and estimate a statistical model for forecasting high quality male Marine Corps enlistment contracts at the local market level.

A step-by-step methodological approach to completing the research associated with this thesis was conducted. Prior Department of Defense accessions studies and previous service-specific enlistment supply studies and models were reviewed. A thorough review of current forecasting models used by the Marine Corps and the Navy was conducted. Interviews were conducted with current enlisted manpower planners at Manpower and Reserve Affairs (M&RA) and Marine Corps Recruiting Command (MCRC) regarding the strengths and weaknesses of current forecasting models. Data was collected at the Marine Corps Recruiting Sub Station (RSS) level by quarter from fiscal year 2003 (FY03) through fiscal year

2007 (FY07). Utilizing the gathered data, an enlistment supply model for the Marine Corps' high quality contracts at the RSS was specified and estimated. Additionally, the availability of data to estimate an enlistment supply model at the zip code or county level was examined for use in follow-on research.

D. ORGANIZATION OF STUDY

As outlined in the Table of Contents, a comprehensive literature review will follow the Introduction. The literature review will look at the current forecasting model used by the Navy as well as previous accessions studies. A discussion of the data utilized throughout the thesis will follow the literature review. This discussion covers data collection, data summary, descriptive statistics, and the methodology of data processing and preparation for model development. Following the discussion of the data a detailed review of the model specification is covered. The model estimation includes the model specification, hypotheses to be tested, interpretation of the overall model and of individual variables. The thesis concludes with a summary and recommendations for follow-on research.

E. CHAPTER SUMMARY

This study attempts to provide manpower planners a more reliable tool in forecasting enlisted accessions for high quality male applicants. This is a crucial step in growing the Marine Corps over the next three years. By accurately forecasting high quality male enlistment contracts at the Marine Corps RSS level a more accurate monthly recruiting goal by region for these applicants can be established.

Additionally, a more effective distribution of recruiting resources can be targeted to the local areas that are forecasted to produce larger numbers of high quality male applicants.

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II. LITERATURE REVIEW

A. NAVY ENLISTED SUPPLY FORECASTING MODEL

1. Current Navy Forecasting Model

When the All Volunteer Force (AFV) was established in 1973, determining what factors attract high quality male applicants became necessary. The Service's enlistment goals were not achieved in the late 1970's leading to a focus on the factors that influenced civilians to enlist in the military. AVF composition studies have since extensively analyzed population size, population demographics and economic factors in order to determine how to target recruiting resources to those who are more likely to enlist.

The current enlistment contracting model utilized by the Navy is called the Enlisted Goaling Model. This model is used to predict what the Navy identifies as "A-cell" contracts, consisting of High School Diploma Graduates (HSDG) scoring in the categories I through IIIA on the Armed Forces Qualification Test (AFQT). In this study these individuals will be referred to as high quality male applicants. As noted by Hogan et al. (2000) this group is the focus population under the assumption that, "the services seldom meet their quota for the high quality enlistments and therefore estimated parameters are more likely to represent true structural supply effects." The Navy identifies it's A-cell recruits as more desirable because they have the highest program qualification rate, the lowest first term attrition, the lowest training costs,

fewer discipline problems, and best career performance, even though they are the most expensive to recruit (NCRC Goal Brief, 2007). This increased cost comes from having to compensate these recruits for the higher opportunity costs from further education or higher civilian wages that would be lost should these higher quality individuals choose to enlist.

The Navy's Enlisted Goal Model predicts Male A-cell production as a function of: past production; recruiter resources; economic factors; demographic factors; and other Naval Recruiting District (NRD) factors (NCRC Goal Brief, 2007). The NRD serves as the equivalent of the Marine Corps Recruiting Station or RS. The results of the model are used to forecast future contract production for the Regions and Districts which are then assigned their share of the contracts that are required for the given year.

Specifically, the Navy's Male HSDG I-IIIA Supply Model is based on NRD level data using a fixed effect, autoregressive form. The independent variables include: the number of naval recruiters; the unemployment rate; relative pay; the male HSDG I-IIIA population; the veteran population; the male HSDG IIIB population; advertising; enlisted bonus; patriotism/retention; historical net contracts obtained (NCO); Delayed Entry Program (DEP) effects, and other service recruiters identified as DoD recruiters.

Ronald A. Hojnowski (2005) conducted a study comparing forecasted contracts based on the Navy's Goaling Model and actual contracts obtained with data from 1994 to 2004. This comparison resulted in a ten year mean difference between

forecasted and actual contracts achieved of only 5.31%. This relative degree of accuracy has resulted in the Marine Corps' desire to develop a similar enlisted contract supply model focused on high quality male applicants.

Although the model in use by the Navy is relatively accurate, there have been various studies that have suggested changes be made to the model. In particular the advertising variable has been recommended for removal from the model. The inclusion of the advertising variable in various specifications of the model estimated in a Center for Naval Analyses (CNA) study (Goldhaber, 1999) resulted in the sign of the advertising variable being negative. This would imply that increases in advertising reduce recruiting efforts. This result is clearly counterintuitive to the true effects of advertising. The same study also found endogeneity of advertising implying the "possibility that there is a correlation between the advertising variable and the error term" (Goldhaber, 1999). Poor recruiting results lead to an increase in resources, including advertising dollars, applied to the recruiting effort. This increased overall effort makes it difficult to clearly identify the exact results of each resource in the overall effort. Although advertising expenditures may increase; time spent by recruiter's may also increase both of which contributing to net contracts achieved.

B. PREVIOUS ENLISTMENT SUPPLY STUDIES

1. Geographical Recruiting Market Areas

Analyzing factors that affect the production of enlistment contracts must be targeted to specific

geographical areas. The Marine Corps currently geographically defines its recruiting area of operations into two recruiting regions (Eastern “ERR” and Western “WRR”), six districts (MCD 1, 4, 6, 8, 9, 12), 48 recruiting stations and over 600 RSS’s, Figure 1 depicts this operational area to the RS level. Recruiters are focused on obtaining new enlistment contracts at the local geographic level. For the Marine Corps this level is the RSS level and, as confirmed by other studies, should be the area of focus when conducting enlistment supply studies when local geographical area data is available.

Many previous Navy enlistment supply contract studies focus on the Naval Recruiting District (NRD), which is the equivalent to the Marine Corps’ Recruiting Station. This level of focus is beneficial in that it, “can be helpful in resource allocation decisions at a highly aggregated regional level” (Jarosz and Stephens, 1999). The Hojnowski (2005) that analyzed the Navy’s enlisted goaling and forecasting model, as it relates to the assignment of enlisted recruiting goal shares, focused on the NRD level with the intent of being used as a signaling tool. “The early projections of the model can be used to determine the likelihood of achieving recruiting success for the year ahead, particularly in the area of male, high quality recruits” (Hojnowski). Based on the Goaling Model’s results the Navy operates within a 5% variation between model estimation and actual achieved contracts for planning purposes. When the actual versus obtained contracted results are examined by each year for the same period a much larger variation is found.

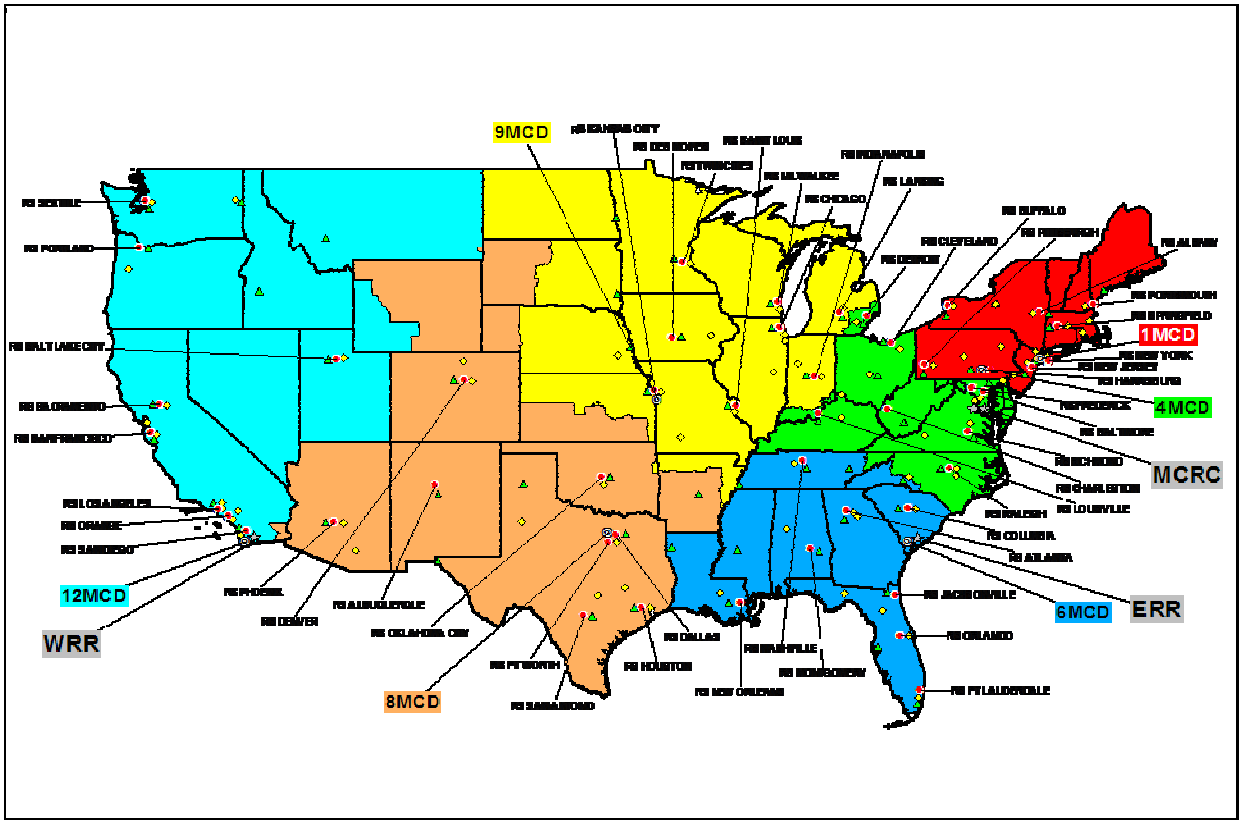

Figure 2.1 From MCRC Area of Operation 2007 Brief

From 1994 to 2004 forecasted contracts versus actual contracts ranged from -10.84% to 12.88%; this accounts for overestimating actual contracts by 10.84% to underestimating actual contracts by 12.88% (Hojnowski, 2005). Some of the reported variation may be caused by generalizing goaling efforts at the 31 NRDs (the Marine Corps RS equivalent) versus focusing on local geographical area where the recruiters are canvassing for recruits. It is at the recruiter's level that model variables such as economics and recruiter density have greater effects.

As noted by Jarosz and Stephens (1999) studies at any level above where recruiters are directly working to obtain new contracts, "provide very little assistance… at the local level in terms of making specific decisions regarding

station location and size.” The recruiting decisions that are acted on at the local geographic level:

> include the number and location of recruiting stations, the assignment of recruiters to those stations, the geographical configuration of each station’s territory, and the quota of each station. More importantly, models that use district data cannot provide estimates of the direct impact of the recruiting station
>
> (Hogan et al., 2000).

To account for the direct impact of recruiting factors and localized economic factors this study is focused on the local geographic level for the Marine Corps, which is identified as the RSS.

2. Recruiter Density and Cross Service Spillovers

Each military branch of service utilizes their recruiter as the military resource designated to obtain contracts. Recruiters as resources have been identified as one of the, “services’ most immediately variable policy tools” (Warner, 1990) through the services’ ability to vary its total recruiting force as well as the concentration of its recruiting force within a local geographical area. Multiple studies have indicated that recruiters positively affect the number of contracts obtained, all else held constant.

The effect recruiters have on increasing the supply of high quality male contracts has been reported to vary by service. In Warner’s (1990) study of recruiting in the 1980’s, he reported a “10 percent increase in either the Army or Navy recruiter force is estimated to increase high-

quality enlistments by about 4 percent. Jarosz and Stephens (1999) reported similar positive results when examining recruiter effects at the Zip Code level for the Navy from 1995 to 1997. They reported a 2.0 to 2.2% increase in net new high quality male applicant contracts for every 10% increase in the Navy recruiter force. The Jarosz and Stephens results are lower than the results of Hogan et al. (2000) who found an own service, “recruiter effect implies an elasticity of about 0.42,” when examining data at the Zip Code level from 1994 to 1997. Although variation exists the results of adding recruiters at the local geographic level appears positive and significant in prior studies.

The impact that a service’s own recruiter has on obtaining high quality applicant contracts is quite clear. The Goldhaber study (1999) reported that recruiters not only increase enlistment but are also a, “relatively cost effective means of increasing supply.” The average cost per high quality contract of recruiters has been estimated between $5,800 for the Navy (Goldhaber) and $7,500 for the Army (Warner).

Previous studies have also examined the effects of other service recruiters operating within the same local geographical area. The spillover effect of multiple services recruiting within the same local geographical area may not be readily apparent as recruiting for one’s own service is the primary goal of a recruiter. This competitive environment seems to actually complement one’s own recruiting effort in that not all recruiter-contacted individuals choose to enlist and not all eligible to enlist individuals are directly contacted. The contact process does

serve to inform eligible individuals about military service and may stimulate interest in enlisting (Warner, 1990). Warner further states that all services, except for the Marine Corps, benefit from increases in recruiter strength within the other services, suggesting there is a complementary effect among DoD recruiters.

This complementary effect is supported by Jarosz and Stephens (1999) in their research utilizing Zip Code level data. A 1.3% to 1.8% increase in Navy high quality male enlistment contracts was estimated for every 10% increase in the Army's recruiting force within the same local geographic area. A similar result was reported by Hostetler (1998) in that five additional contracts written by other services would result in one new contract obtained by the Navy. Hogan et al. (2000) found similar results in that a 10% increase in the Navy recruiter force within the same local geographic area as an Army recruiting force is estimated to result in an 0.3% increase in Army high quality male contracts attained.

3. Local Area Economic Factors

John T. Warner's (1990) review of recruiting programs of the 1980's noted that analyses of military labor supply should contain two key economic factors: the civilian to military pay ratio and the civilian unemployment rate. These economic factors have been analyzed in numerous contract supply studies and estimated through the use of fixed effects. For further discussion on fixed effects refer to Warner's 1990 study. In all cases higher relative pay and higher unemployment rates induce increased enlistments. Warner (1990) reported a 10 percent increase in relative pay

resulted in a 2% 5% increase in high quality contracts, depending on the service. Similar results are found when examining civilian unemployment rates. The Warner (1990) study reported estimates indicating a 10% change in the civilian unemployment rate results in a 4.0% to 5.5% change in high quality enlistments. The effect of unemployment on high quality enlistments was realized during a drastic decrease in unemployment rate found from 1983 to 1988.

> [T]he decline in the civilian unemployment rate from 9.5 percent in 1983 to 5.5 percent in 1988-a 43 percent reduction- is estimated to have reduced high-quality enlistments by between 17 and 24 percent.
>
> (Warner, 1990)

The estimation of Navy Enlistment conducted by Hostetler (1998) found that when holding other variables constant a 1% increase in the unemployment rate resulting in a 1.7% increase in Navy new contract production at the Zip Code level. When the effects of unemployment on high quality male contracts were estimated in major metropolitan areas by Jarosz and Stephens (1999) a 10% increase in unemployment was estimated to produce a 2.3% to 2.5% increase in contract production per quarter.

4. Population Factors

The population of eligible enlistees is a driving factor in the amount of resources a service should apply towards obtaining high quality male contracts. In particular, the population of 17-24 year old male HSDG scoring in the AFQT category of I-IIIA should be a determining factor in allocating resources to local

geographic areas. Population densities have been examined by numerous studies confirming that a higher population pool results in a higher amount of contracts achieved.

The Jarosz and Stephens (1999) study focused on major metropolitan areas and found the effect of population to be positive and statistically significant in all model specifications. The study showed a 10% increase in the high quality male applicant population increased Navy contracts by approximately 4% per quarter. Similar results were found by the Hostetler study that further broke the population down by Zip Code as well as by race. Dependent upon the racial identifier used the results from the Hostetler study estimated that a 10% increase in the target population results in an increase in a 3.6% to 4.2% increase in new contract production for the Navy. The results of these studies reinforce the assumption that as the population of high quality males increases within a local geographic area the amount of contracts obtained should also increase.

C. CHAPTER SUMMARY

Various studies since the late 1970’s have attempted to identify those variables that best predict youth decisions about enlisting in the armed forces. Many variables have been identified that have enabled the development of enlistment forecasting models, such as the Navy’s Goaling Model, that help to predict the supply of high quality male enlistments each year. Such models provide a basis for manpower planners to determine how to distribute the limited available recruiting resources in order to meet the desired contract goal for the year.

Economic factors such as the unemployment rate and the civilian to military pay ratio are not able to be adjusted by manpower planners but have been shown to be statistically related to new contracts for a given year. Additionally, the population of eligible high quality male applicants within a geographic is not influenced by the recruiting force but clearly higher population densities of these individuals result in an increase in contracts in a given area. The adjustable variable of recruiters within a local geographic area not only has a positive impact upon the amount of contracts obtained but, tends to be a cost-effective method of obtaining new contracts in comparison to other recruiting tools (such as advertising). Since advertising, as a variable, has been shown to have statistical problems in the Navy's Goaling Model, as found by Goldhaber (1999), the advertising variable will not be examined within this study.

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III. DATA

The data set constructed for use in this analysis was formed by combining over 20 separate data files which were obtained in various formats from numerous sources. The sources of data include the Defense Manpower Data Center (DMDC), the Bureau of Labor Statistics (BLS), the 2000 Census Report, the Bureau of Economic Analyses (BEA) and Defense Finance and Accounting Service (DFAS). Three data files were constructed from the primary source data.

By consolidating source data sets by geographical region, three primary data files were created. The first data file combined data identifiable by an RSS identifier. The second data file combined data identifiable by county code. The third data file constructed was a master data file that combined the first two data files as well as state and annual data. This file was used for estimating the high quality male enlistment supply model.

A. RECRUITING SUB STATION DATA

Data found in the RSS data file possessed an RSS identifier labeled (MUD Code). This unique identifier is generated by MCRC and is used to alpha-numerically identify each RSS. This data is sourced by MUD Code as well as a time identifier, using year and month. The Recruit Marketing Information System (RMIS) was used to gather data at the RSS level and was extracted in CSV form by month from October 2002 through June 2007. All CSV formatted data was converted to Microsoft Office Excel (xls) files. Excel files were then imported into Stata 9.2 statistics/data analysis software

and converted to Stata files for later model development and regression analyses. Figure 3.1 represents the RMIS data merging process.

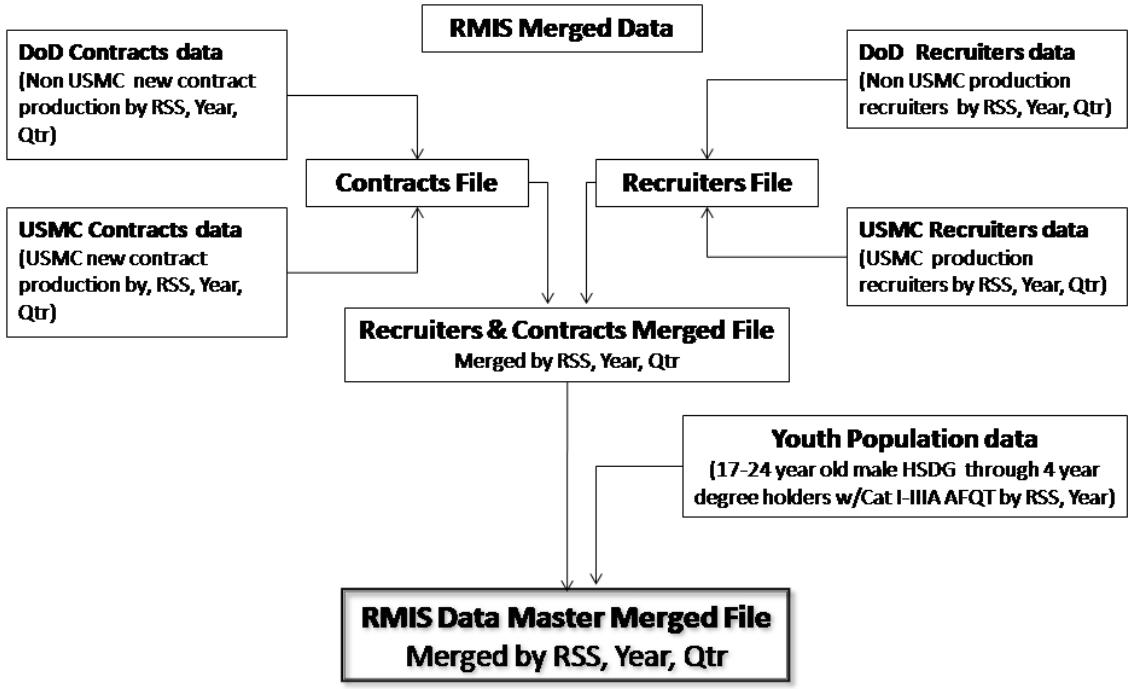

Figure 3.1 RMIS Merged Data Flow Chart

B. RECRUIT MARKETING INFORMATION SYSTEM (RMIS)

As discussed in Chapter II, gathering data at the geographic level where the recruiter canvasses for contracts is important in developing an estimation model that will forecast high quality male applicants. For the purposes of this study the Recruiting Sub Station for the Marine Corps was identified as the desired geographic level at which to acquire data. To obtain RSS reported data, access to the Recruit Management Information System (RMIS) 4.2-web application version 2.0 was obtained through DMDC and Marine Corps Recruiting Command (MCRC). RMIS serves as an Internet-based version of the Recruit Market Network mainframe

system, and as such provides information that supports recruiting efforts in the form of Oracle data tables (RMIS Users Guide, 2007). Through simple query functions, data was extracted through the RMIS web accessible mainframe in comma separated value (CSV) form.

1. Contract Data

Due to large file size, contract data was extracted through RMIS in three separate files. DoD contract data formed two of the data files that were merged together by RSS identifier and a year-month time identifier. The DoD contract file was then merged with the USMC contracts file to form a single contracts file. The consolidated contract data file contained all high quality male applicant contracts signed by year and month per RSS for the Marine Corps from the beginning of FY03 through the third quarter of FY07. Additionally, other services' high quality male applicant contracts signed during the same period and same RSS region were present in the contracts data file. The FY03, quarter 2 contract records were not present in the Marine Corps or DoD contracts files as this time period is not found in the DMDC RMIS record.

2. Recruiter Data

DoD recruiter data formed three of the data files that were merged together in Excel by RSS identifier and a year-month time identifier. The DoD recruiter file was then merged with the USMC recruiter file to form a single recruiter file.

The recruiter data file contains the total number of production recruiters by year and month per RSS for the Marine Corps from the beginning of FY03 through third quarter of FY07. “The production recruiter file is monthly recruiter strength numbers submitted by each of the Service components” (RMIS Users Guide, 2007).

The sum of Army, Navy, and Air Force production recruiters, recruiting over the same time period and same RSS region were present in the recruiters data file. The FY03 quarter 2 recruiters’ records were not present in the Marine Corps or DoD recruiter files due to this time period not being present in the DMDC RMIS record. As previously noted, FY07, quarter four data was not yet available at the time of data extract (Spring 2008).

3. Civilian Youth Population Data

Civilian youth population data was extracted through RMIS as a single data file sorted by MUD Code and the time identifier of year and month. Woods and Poole Economics, Inc. is the civilian firm that has been contracted by DoD to provide annual population estimates. The civilian youth population data file extracted from RMIS was based on Woods and Poole population estimates for 17-year old to 24-year old males that were high school seniors through four year degree holders that scored in Category I-IIIA on the AFQT. The data was sorted by year and month and geographically pooled by Marine Corps RSS using MUD Codes from the beginning of FY03 through the third quarter of FY07.

C. COUNTY LEVEL DATA: UNEMPLOYMENT RATE

Civilian unemployment rate data was obtained from the Bureau of Labor and Statistics (BLS) at the county level by year from 2003 through 2007. All of the data files were then merged together by FIPS (state and county) codes (Federal Information Processing Standards) and year identifier. The unemployment rate file was then merged with the state level data file after sorting by FIPS code. The common (state) FIPS codes facilitated the mergeing process between the unemployment rate and state level datasets.

D. STATE LEVEL DATA

State level data was obtained for variables that could not be directly associated to an RSS. This level of data was indirectly associated to RSS level data through the use of FIPS (state) codes. Sources of state level data were obtained directly from public access websites for civilian wage and veteran population variables.

1. Civilian Manufacturing Wage Data

Civilian wage data for the 17-24 year old male population from 2003 through 2006 was estimated using manufacturing wage data obtained from the Bureau of Economic Analysis (BEA) at the state level. Due to format, wage data was extracted from the BLS website in four separate files, one for each year. All of the data files were merged together by FIPS codes and sorted by the year identifier. At the time of this research, wage data was unavailable for 2007 and was estimated by adding the inflation rate for 2006

to the known 2006 state manufacturing wage. The wage file was then merged with the county unemployment rate file after sorting by FIPS code and year.

2. Veteran Population

"The gold standard for veteran population estimates is the decennial census of the population conducted by the Census Bureau" (Veteran's Administration, 2000). Therefore, veteran population data was obtained from the Census Bureau website under the subtopic of 2000 Census. State level estimates for the calendar year 2000 veteran population were used for years 2003 through 2007. Veteran population data was merged to civilian manufacturing wage data by state and year.

E. OTHER DATA: MILITARY PAY

Information on annual military pay was obtained for this analysis; however, military pay does not vary cross-sectionally. Military pay charts were obtained for FY03 through FY07 with the average E-1 through E-3 entry pay calculated for each individual year. This data was then merged with all remaining data files by year.

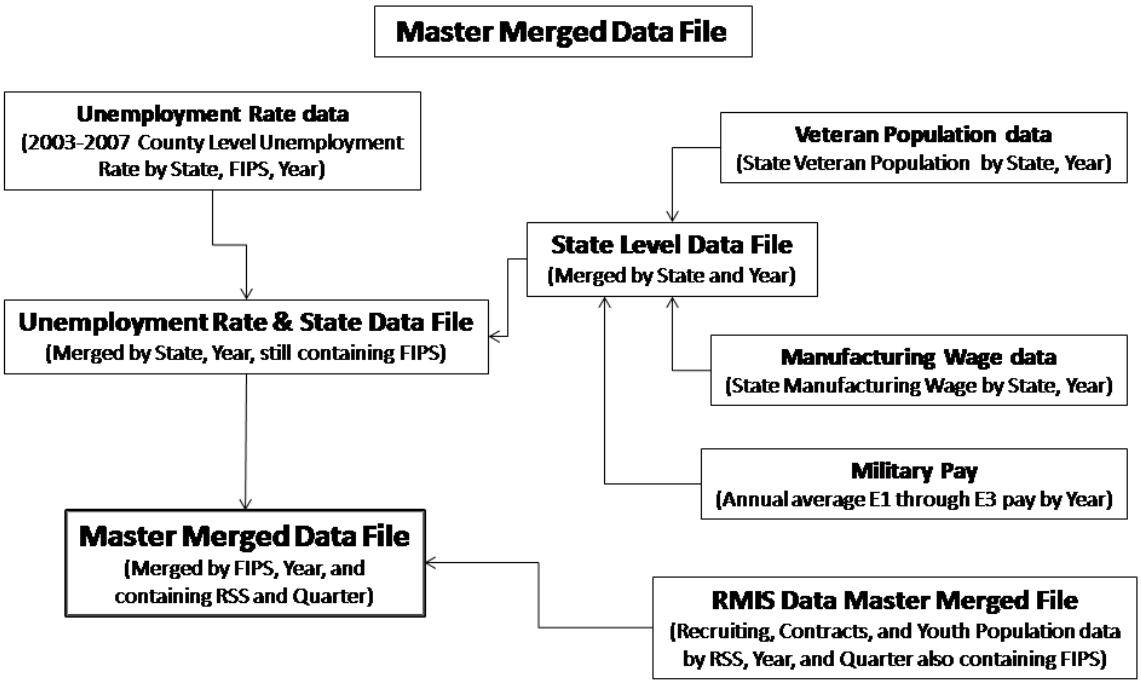

Figure 3.2 Final Master Data Set Merge Flow Chart

F. VARIABLE DESCRIPTION

The condensed data file identified as the "Master Merged Data File" in Figure 3.2, served as the basis for later enlistment supply model development. Variables were identified and created from the condensed data file using Stata 9.2 and can be found in Table 3.1, the glossary of variables. Unique variables were formed for this analysis and can be identified in the glossary of variables.

Variables containing the per capita extension are regular variables, such as USMC production recruiter population (USMC recruiters) for a set RSS and time period, divided by youth population for the same RSS and time period:

USMC recruiters/per capita = USMC recruiters/youthpop

This variable is the ratio of Marine Corps recruiters assigned to an RSS (per month) to the population of high quality male applicants residing within the same RSS area over the same period of time.

Variable Identification Table	
Variable Name	**Variable Description**
RSS Dummies	Recruiting Sub Station identifier. Dummy variables were created for each of the 606 RSS
year Dummies	Dummy variables for years 2003 through 2007
qtr Dummies	dummy variables for each quarter of a fiscal year
USMC male contracts	Total USMC high quality male contracts obtained in an RSS area within a fiscal year quarter
Youthpop	17-24 year old male High School Seniors through 4 year degree holders scoring in Category 1-IIIA on the AFQT by RSS by year
Ur	County Unemployment Rate for 2003 through 2007 converted to panel data by year and RSS
Wage	County Manufacturing Wage average for 2003 through 2006 and State Manufacturing wage for 2007 converted to panel data by year and RSS
Milpay	E1 to E3 average annual wage b year from 2003 through 2007
milcivpay_ratio	milpay variable divided by wage variable
vet_percent	2000 Census veteran population
DoD recruiters	Total non-USMC recruiters operating within an RSS area by fiscal year quarter
USMC recruiters	Total USMC recruiters operating within an RSS area by fiscal year quarter
log_USMC recruiters	Natural log of usmcprodtotal variable
log_DoD recruiters	Natural log of dodpodtotal variable
Log_USMC male contracts	Natural log of usmcmalecontracts variable
log_youthpop	Natural log of youthpop variable
log_ur	Natural log of ur variable
log_wage	Natural log of wage variable
log_vetpercent	Natural log of vetpercent variable
log_milcivpay_ratio	Natural log of milcivpay_ratio variable
log_USMC recruiters/per capita	Natural log of usmcprodtotal variable divided by the Natural log of youthpop variable
log_DoD recruiters/per capita	Natural log of usmcprodtotal variable divided by the Natural log of youthpop variable
log_USMC male contracts/per capita	Natural log of usmcprodtotal variable divided by the Natural log of youthpop variable

Table 3.1 Glossary Of Variables

Summary statistics were calculated from the Master Merge Data File and are displayed in Table 3.2. The number of observations per variable found within the Master Merge data file in Table 3.2 is based on those that successfully merged without error.

Final Consolidated, Pre-Collapsed Summary Statistics					
Variable	Obs	Mean	Std. Dev.	Min	Max
RSS	71288	290.5303	176.0049	1	606
year	71288	2004.923	1.4012	2003	2007
qtr	70169	2.4414	1.1092	1	4
DoD recruiters	70169	8.2371	14.1817	0	159.535
USMC recruiters	70169	2.0198	3.4878	0	41.55
DoD contracts	70169	6.1498	9.3472	0	106
USMC male contracts	70169	1.8407	2.9722	0	26
USMC all contracts	70169	2.0069	3.2189	0	27
Youth population	58778	371.6023	374.5506	0	3896
Unemployment Rate	71167	5.4291	1.7418	1.3	20.9
Wage	71288	45251.57	6983.0720	26309	65326.12
vet_percent	71288	13.1142	1.4992	10	17
Milpay	71288	15679.88	862.9530	14587.2	17178

Table 3.2 Summary Statistics of Complete Data Set

The large number of observations can be attributed to data entry observations being recorded for all FIPS codes for all observed fiscal year quarters. All merged observations were then condensed to RSS by fiscal year quarter beginning with quarter 1 of FY03 through quarter 3 of FY07. Summary statistics are displayed in Table 3.3.

Final Consolidated, Post-Collapsed Summary Statistics					
Variable	Obs	Mean	Std. Dev.	Min	Max
RSS	10802	302.9509	175.2174	1	606
year	10802	2004.945	1.393336	2003	2007
qtr	10802	2.444547	1.11671	1	4
DoD recruiters	10802	51.88015	23.58997	2.099	355.059
USMC recruiters	10802	12.7185	5.182058	0.456	56.124
USMC male contracts	10802	11.39243	7.22153	0	120
DoD recruiters/youth pop	10802	.6312	.1016	.1153	1.0362
USMC recruiters/youth pop	10802	.4005	.0863	0	.7071
USMC Contracts/youth pop	10705	.3702	.1103	0	.9027
Youth population	10802	597.547	424.91	48.17895	3896
Unemployment Rate	10799	5.386876	1.371691	2.15	16.9
Wage	10802	47477.77	7180.39	26309	65326.12
vet_percent	10802	12.78347	1.725129	10	17
Milpay	10802	15691.53	858.8332	14587.2	17178

Table 3.3 Summary Statistics of RSS, Fiscal Year Quarter Data

At the time of this research (Spring 1008), quarter 4 FY07 was not yet available for all RMIS extracted data files. Due to a total of two quarters not being available (quarter 2 FY04 and quarter 4 FY07) and incomplete merges of data the files provided complete information on 10,799 total observations, rather than the 10,908 that were expected. Unemployment rate data serves as the limiting variable in the research. In the cases of missing observations found within the Master Merge Data File, the observations were dropped resulting in a net 10,799 total observations. It is this final data set that was used for the estimation of the Marine Corps Enlisted Supply Model for High Quality Male Applicants.

G. CHAPTER SUMMARY

The formation of the data set used in this research was developed from over 20 data files from various sources that were condensed into a single file identified as the Master Merge Data File. The Master Merge Data File associated like data by RSS and a time variable. Once all data was merged together, it was compressed using Stata 9.2 by RSS, year, and quarter. Using the limited observations variable of unemployment rate, a final data set consisting of 10,799 observations was used for model development.

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IV. MODEL ESTIMATION

This chapter discusses the model results that were obtained from the pooled-time series data base that was described in Chapter III. Although four specifications of the model were estimated, the primary prediction model is the one that includes the variables adjusted by youth population and accounts for fixed effects.

A. MODELS

Four different model specifications were estimated. The different specifications were used to test the robustness of the effects of the key independent variables, such as Marine recruiters. One set of models estimates contracts per capita of youth population, while the second estimates total contracts. Within these two general models, one model includes dummy variables for Recruiter Sub Stations (RSS) to control for any fixed effects (e.g., military propensity), over geographic areas whereas the other excludes the RSS fixed effects. If an otherwise unobserved factor (e.g., propensity) is correlated with contract production and is also correlated with one of the explanatory variables, then the estimated coefficients of the explanatory variable (recruiters) will be biased. Adding fixed effects is one method of adjusting for this bias.

B. MODEL SPECIFICATIONS

The models were specified in two general ways: (1) in the first specification, the dependent variable was enlistment contracts per capita of youth population, and

certain independent variables (recruiters) were adjusted for youth population; (2) in the second, the dependent variable was total enlistment contracts and youth population was used as an independent variable. The first model was based on a common specification found in the literature, which is used to adjust for potential heteroscedasticity. Both models were run with and without the RSS fixed effects. The RSS dummies account for local area factors, such as military propensity, that are not otherwise captured by the independent variables. Models are specified in log-log form:

$$N_i = \beta * X_i + \mu + \varepsilon$$

Where N_i is the log of the number of high quality male contracts obtained, and X_i is the log of the explanatory variables, which include Marine recruiters, DoD recruiters, youth population, the unemployment rate, and the military-to-civilian pay ratio. The term μ represents the fixed effects, which are accounted for by the RSS.

Another reason to use the log-log specification is that parameter estimates represent elasticities; thus, each coefficient is interpreted as the percentage change in high quality male contract production for each one percent change in the independent variable when all other factors are held constant in the model. In all cases the dependent variable is the log of the number of high quality male contracts that were obtained in each RSS area of operations during each of the observed 18 quarters from FY03 through FY07. The models produced R^2 values ranging between 0.44 and 0.61, representing the variation in the dependent variable that can be explained by the independent variables.

C. HYPOTHESIS AND DESCRIPTIVE STATISTICS

1. Hypothesis

Based on previous studies and other service model results, the effect of the key variables on high quality male contract production is hypothesized to be positive. For example, it is expected that unemployment rates will have a positive effect on contract production, meaning that as unemployment rates increase in each local market area contracts also should increase. This relationship reflects the opportunity cost of a youth choosing military service. In this case, when local unemployment rates are high the Marine Corps provides a better employment opportunity than the civilian employment jobs available in a local area. Marine recruiters also are hypothesized to positively affect contract production with additional recruiters in the local area increasing the number of high quality contracts obtained, all else equal. Finally, changes in the military-to-civilian pay ratio should also have a positive relationship with the number of high quality contracts. As military pay grows relative to civilian wages it is hypothesized that high quality male contracts will increase; conversely, when civilian pay rises relative to military pay the military-to-civilian pay ratio drops and contracts also should drop.

2. Descriptive Statistics

The data file used to estimate the models are based on quarterly contracts for 606 recruiting sub stations for 5 years over the period 2003-2007. This provides a data set

consisting of 18 total quarters for 606 sub stations, yielding a total of 10,799 observations. However, the number of observations used for the statistical models was reduced to 10,702 due to deletion of observations with erroneous data. Table 3.3 in Chapter III provided descriptive statistics for the variables included in the estimating models.

D. INTERPRETING MODEL RESULTS

1. Per Capita Contract Model, with RSS Fixed Effects

The primary model specification uses contracts per capita as the dependent variable. The log-log specification that accounts for fixed effects is the model used in various past studies, and serves as the primary model of this analysis. The results can be found in Table 4.1. Table 4.1 omits the coefficients of the 606 RSS dummy variables to conserve space. However, the Appendix shows that many of the individual RSS dummies are statistically significant (the omitted RSS is 219# Hammond, LA). Full model results can be found in the Appendix.

Per Capita Contract Model, with RSS Fixed Effects			R^2 =.6059	Adj. R^2 =.5820
log_USMC male contracts/per capita	Coef.	Std. Err.	t	P>t
log_USMC recruiters/per capita	0.8626	0.0152	56.7000	0.0000
log_DoD recruiters/per capita	0.0336	0.0231	1.4600	0.1460
log_ur	0.0324	0.0079	4.0800	0.0000
log_milcivpay_ratio	1.0080	0.6490	1.5500	0.1200
year_2003	-0.0023	0.0041	-0.5700	0.5710
year_2004	-0.0178	0.0039	-4.6000	0.0000
year_2005	-0.0198	0.0031	-6.3000	0.0000
year_2006	-0.0079	0.0032	-2.5000	0.0120
(Fiscal Year)qtr_1	-0.0008	0.0020	-0.3800	0.7040
(Fiscal Year) qtr_2	0.0147	0.0022	6.7900	0.0000
(Fiscal Year) qtr_3	0.0365	0.0020	18.2400	0.0000
_cons	-0.9123	0.5763	-1.5800	0.1130

Table 4.1 Per Capita Contract Model, with RSS Fixed Effects

As hypothesized, recruiter levels, the local unemployment rate and the military-to-civilian pay ratio all have positive estimated coefficients. An increase in estimated contract production between fiscal year quarters 1 and quarter 3 is also noted and coincides with increased production levels that occur at the end of the school year and the peak basic training summer shipping months of fiscal year quarter 3.

The coefficients of USMC recruiters, DoD recruiters, the unemployment rate, and the military-to-civilian pay ratio are all positive indicating that changes in these variables are positively related to high quality male contract production for the Marine Corps. The DoD recruiters and military-to-civilian pay ratio coefficients were not found to be statistically significant at any level less than 10%. The DoD recruiter coefficient was significant at the .14 level and the military-to-civilian pay ratio coefficient

was found to be significant at the .12 level. The USMC recruiters and unemployment rate variables are statistically significant at a level greater than 1% as indicated by their respective p-values.

The coefficient of Marine recruiters indicates that a 10% increase in Marine recruiters is estimated to increase high quality male contract production by 8.62%. Similarly the same 10% change in unemployment rate would increase high quality male contract production by 0.32%. At the mean level of the unemployment rate in this data (approximately 5%) an increase in the unemployment rate by 1 point (about 20%) would increase high quality male contracts by nearly 1%.

The coefficient of the military-to-civilian pay variable indicates that a 10% increase in military pay will increase enlistments by 10% (although the coefficient is only marginally significant at the .12 level). Although the magnitude of change in contract production that can be expected by closing the military-civilian pay gap exceeds that of the estimated effect of increasing Marine recruiter levels, it is important to note that recruiter levels can be adjusted within the Marine Corps while changes in pay require congressional and DoD approval. Thus, changing pay is a much less flexible policy option to increase production levels. The variation in high quality male contracts that can be explained by the model in Table 4.1 is 60.6% as indicated by an R-squared of 0.606.

2. Per Capita Contract Model, without RSS Fixed Effects

While the specification in Table 4.1 is the preferred specification because it mirrors the model found in the

previous literature, several variants of this basic model were run to test the robustness of the key coefficients. Table 4.2 shows the results from estimating the basic model but omitting the RSS fixed effects (year and fiscal year quarter dummies, however, are included in the model). As discussed above, this model may generate biased coefficients by omitting geographic-based fixed effects.

Per Capita Contract Model, without RSS Fixed Effects			R^2 =.5094	Adj. R^2 =.5088
log_USMC male contracts/per capita	Coef.	Std. Err.	t	P>t
log_USMC recruiters/per capita	0.8788	0.0123	71.4200	0.0000
log_DoD recruiters/per capita	0.0316	0.0107	2.9500	0.0030
log_ur	0.0049	0.0034	1.4400	0.1500
log_milcivpay_ratio	0.0683	0.0665	1.0300	0.3050
year_2003	0.0013	0.0026	0.5100	0.6100
year_2004	-0.0157	0.0028	-5.6600	0.0000
year_2005	-0.0195	0.0025	-7.8400	0.0000
year_2006	-0.0110	0.0025	-4.4500	0.0000
(Fiscal Year) qtr_1	-0.0009	0.0022	-0.4100	0.6800
(Fiscal Year) qtr_2	0.0147	0.0023	6.2800	0.0000
(Fiscal Year)qtr_3	0.0363	0.0022	16.7400	0.0000
_cons	-0.0764	0.0600	-1.2700	0.2030

Table 4.2 Per Capita Contract Model, without RSS Fixed Effects

The results show that the USMC recruiter, DoD recruiter, the unemployment rate and the military-to-civilian pay ratio coefficients are all estimated to be positive. Additionally, both USMC recruiter and DoD recruiter variables are statistically significant at less than the 1% level while the unemployment rate and the military-to-civilian pay ratio are statistically significant at only the .15 and .31 levels, respectively. Thus, as

compared to Table 4.1, in Table 4.2 the unemployment rate variable became insignificant whereas the DoD recruiters variable became significant.

The USMC recruiters and DoD recruiter estimated effects on contract production are very similar to the estimated effects that are found in the primary model in Table 4.1, but the DoD recruiters variable is now statistically significant at the .01 level. For example, a 10% increase USMC recruiters is estimated to increase high quality male contracts by 8.79% in Table 4.2 versus the 8.62% found in the primary model results of Table 4.1. DoD recruiters still has a complimentary relationship with Marine contracts—a 10% increase in DoD recruiters at the RSS level increases Marine contract production at the RSS by 3.1%. The same fiscal year trend is noted, with an estimated increase in high quality male contract production occurring in quarter 3. The estimated effects of the unemployment rate and the military-to-civilian pay variable are far less than the estimated effects found in the primary model. The coefficient of the pay variable dropped to only .068, but is still statistically insignificant. It is worth noting that the model in Table 4.2 R^2 drops to .50 from about .60 in the model in Table 4.1. This is due to dropping the large number of RSS dummies from the model.

3. Total Contracts Model, with RSS Fixed Effects

A third log-log model was estimated where the dependent variable was total quarterly RSS contracts (versus per capita contracts in Tables 4.1 and 4.2). In this model youth population was entered in the model to control for size of the local market area. Table 4.3 presents the results.

Total Contracts Model, with RSS Fixed Effects			R^2=.5791	Adj. R^2=.5536
log_usmc male contracts	Coef.	Std. Err.	t	P>t
Log_USMC recruiters	0.8625	0.0155	55.6000	0.0000
log_DoD recruiters	-0.0151	0.0241	-0.6300	0.5300
log_youthpop	-0.2379	0.0537	-4.4300	0.0000
log_ur	0.2051	0.0479	4.2800	0.0000
log_milcivpay_ratio	5.9743	3.9246	1.5200	0.1280
year_2003	-0.0243	0.0247	-0.9800	0.3260
year_2004	-0.1151	0.0234	-4.9100	0.0000
year_2005	-0.1267	0.0190	-6.6700	0.0000
year_2006	-0.0508	0.0192	-2.6400	0.0080(
(Fiscal Year) qtr_1	-0.0054	0.0121	-0.4500	0.6530
(Fiscal Year) qtr_2	0.0870	0.0131	6.6500	0.0000
(Fiscal Year) qtr_3	0.2196	0.0121	18.1500	0.0000
_cons	-4.0713	3.5075	-1.1600	0.2460

Table 4.3 Total Contracts Model, with RSS Fixed Effects

The coefficients of Marine recruiters, the unemployment rate and the military-to-civilian pay ratio are again found to have positive coefficients. The estimated effect of Marine recruiters on contract production is nearly identical to that found in the primary model in Table 4.1. Unlike previous models, the estimated coefficient of the military-to-civilian pay variable is implausibly large and not statistically significant at less than the .10 level. Similarly, the coefficient of the unemployment rate variable is positive but has increased in size compared to the unemployment coefficient estimated in Table 4.1, .20 versus.03. The same progressive increase in quarter dummy coefficients is again noted and coincides with increased recruiter production levels that are expected in the third quarter.

Other DoD recruiters are estimated to have a slight negative impact on recruiter production in this specification of the model but as indicated by the p-value

the coefficient is not statistically significant at less than the 10% level. The coefficient of the military-to-civilian pay ratio is found to be extremely large, as in Table 4.1, but it is not statistically significant. Additionally, youth population is estimated to be negatively and significantly associated with production.

Although the negative coefficient on the youth population variable appears counterintuitive to what is expected it may be explained as a function of the number of recruiters relative to the total youth population. As the population of youth increases, but the number of USMC recruiters is held constant, the ability of a fixed number of recruiters to canvass this larger population declines. Mission may still be met by recruiters but a segment of the population is not canvassed and, therefore, potential applicants are not contracted. The number of total high quality male production that can be explained by the model results found in Table 4.2 is 57.91% as indicated by an R-squared of 0.5791.

4. Total Contracts Model, without RSS Fixed Effects

The final model variant simply removes RSS fixed effects from the model in Table 4.3. The results of this model are presented in Table 4.4.

Total Contracts Model, without RSS Fixed Effects			R^2=.4714	Adj. R^2=.4708
log_USMC Male Contracts	Coef.	Std. Err.	t	P>t
log_USMC recruiters	0.8890	0.0126	70.7400	0.0000
log_DoD recruiters	0.0203	0.0125	1.6200	0.1050
log_youthpop	-0.0065	0.0071	-0.9300	0.3540
log_ur	0.0334	0.0207	1.6100	0.1070
log_milcivpay ratio	0.5126	0.4133	1.2400	0.2150
year_2003	0.0096	0.0158	0.6100	0.5450
year_2004	-0.0929	0.0168	-5.5200	0.0000
year_2005	-0.1192	0.0151	-7.8900	0.0000
year_2006	-0.0677	0.0150	-4.5000	0.0000
(Fiscal Year) qtr_1	-0.0064	0.0132	-0.4900	0.6260
(Fiscal Year) qtr_2	0.0872	0.0142	6.1400	0.0000
(Fiscal Year) qtr_3	0.2196	0.0132	16.6900	0.0000
_cons	-0.4991	0.3964	-1.2600	0.2080

Table 4.4 Total Contracts Model, without RSS Fixed Effects

The USMC recruiter, DoD recruiter, unemployment rate and military-to-civilian pay variables are all estimated to have positive effects on high quality male contract production. The effect of USMC recruiters on contract production is very similar to the model results presented in Table 4.3. A 10% increase in USMC recruiters is estimated to produce 8.89% more high quality male applicants in Table 4.4, compared to Table 4.3 where the same USMC recruiter increase is estimated to produce 8.63% more high quality male contracts.

In contrast to the DoD recruiters coefficient estimated in Table 4.3, the results of Table 4.4 are similar to those of the primary model in Table 4.1. The model in Table 4.4 estimates a 10% increase in other DoD recruiters will produce 0.20% more high quality male Marine contracts. The

DoD recruiter variable is marginally significant at the .105 level. These findings are similar to the primary model, presented in Table 4.1, that estimates the same increase in other DoD recruiter levels will result in a 0.34% increase in USMC high quality male contracts. Again, the coefficient of the DoD recruiters variable reaffirms a cooperative, not competitive, situation among service recruiters.

The estimated negative effects of youth population on contract production are similar to the results in Table 4.3 and as previously discussed, can be explained in the same manner. However, the youth population variable is not statistically significant. The military-to-civilian pay ratio is also statistically insignificant, although its magnitude is similar to previous findings (Warner, 1990). The size of the military-to-civilian pay ratio is significantly reduced from the estimated effects of Table 4.3 and is about half that of the results in the primary model found in Table 4.1.

5. Summary of Recruiter Effects

Table 4.5 summarizes the results of the estimated effects of Marine recruiters, as represented by the USMC recruiters variable, on high quality male contracts in the four different model specifications. Of all variables included in each model specification, the Marine recruiters variable had the largest elasticity and was significant at the 1% level in all models specified, Table 4.1 through Table 4.4.

Model	Description	Marine Recruiter Elasticity	Other Studies
Per Capita Model, W/RSS Fixed Effects Table 4.1	Marine Recruiters/per capita, DoD Recruiters/per capita, Unemployment Rate, Military Civilian Pay Ratio, RSS, Year, QTR	0.8626***	0.48(a)
Per Capita Model, W/O RSS Fixed Effects Table 4.2	Marine Recruiters/per capita, DoD Recruiters/per capita, Unemployment Rate, Military Civilian Pay Ratio	0.8788***	0.96(a)
Total Contracts Model, W/Fixed Effects Table 4.3	Marine Recruiters, DoD Recruiters, Youth Population, Unemployment Rate, Military Civilian Pay Ratio, RSS, Year, Qtr	0.8625***	N/A
Total Contracts Model, W/O Fixed Effects Table 4.4	Marine Recruiters, DoD Recruiters, Youth Population, Unemployment Rate, Military Civilian Pay Ratio	0.8890***	N/A

(a) Warner (1990)

Table 4.5 Summary of Effects of Marine Recruiters
(* significant at 10%, ** significant at 5%, *** Significant at 1%)

The estimated elasticity of Marine recruiters' ranges between .86 and .89. In the primary model in Table 4.1 a 10% increase in Marine recruiters in a local area increases high quality male contracts by 8.6%. This elasticity is four times that of Navy recruiters at the Navy RSS-equivalent (station) level (Jarosz and Stephens, 1999). The effect of Navy recruiters located at Navy Recruiting Stations in the 1999 Jarosz and Stephens study was based on an average of 1,100 Navy recruiting stations, virtually twice as many Marine RSS equivalents. The concentration of Marine recruiters into fewer recruiting locations might be the reason that the effect of recruiters is larger in the Marine Corps.

The estimated Marine recruiter elasticity also exceeds those found in the 2000 Hogan et al. study, which reported an Army recruiter elasticity of 0.42, about half that in

this study. Similar to the 2000 Hogan et al. study, the 1990 Warner study reported an elasticity of Marine recruiters on high quality male contracts to be 0.48, the 1990 Warner study results are presented in Table 4.5 in the “Other Studies” column. Warner did note that a services’ recruiter force was an important policy tool for varying high quality enlistment contracts and that the Marine Corps results in his model were sensitive to including a time trend. In addition, Warner’s study was based on RS-equivalent level data as well as annual totals for service. Present Marine Corps policy changes related to the “grow the force” initiatives and an increasing recruiter force size may be reflected in the large elasticity found in this study, assuming the number of facilities has not grown proportionately.

6. Summary of Unemployment Rate Effects

Table 4.6 summarizes the results of the unemployment rate on high quality male contracts. The unemployment rate was found to be significant at the 1% level in all models estimated with RSS fixed effects.

Model	Description	Unemployment Rate Elasticity	Other Studies
Per Capita Model, W/RSS Fixed Effects Table 4.1	Marine Recruiters/per capita, DoD Recruiters/per capita, Unemployment Rate, Military Civilian Pay Ratio, RSS, Year, QTR	0.0324***	0.04 (a)
Per Capita Model, W/O RSS Fixed Effects Table 4.2	Marine Recruiters/per capita, DoD Recruiters/per capita, Unemployment Rate, Military Civilian Pay Ratio	0.0049	N/A
Total Contracts Model, W/Fixed Effects Table 4.3	Marine Recruiters, DoD Recruiters, Youth Population, Unemployment Rate, Military Civilian Pay Ratio, RSS, Year, Qtr	0.2051***	N/A
Total Contracts Model, W/O Fixed Effects Table 4.4	Marine Recruiters, DoD Recruiters, Youth Population, Unemployment Rate, Military Civilian Pay Ratio	0.0334*	N/A

(a) Jarosz and Stephens (1999)

Table 4.6 Summary of Effects of the Unemployment Rate

(* significant at 10%, ** significant at 5%, *** Significant at 1%)

The estimated elasticity of the unemployment rate ranged from 0.005 to 0.21 in the specifications of all the models run. The primary model results, presented in Table 4.1, find that a 10% change in the unemployment rate would result in a 0.32% increase in high quality male contracts. This range in elasticity is commensurate with the results of past studies, particularly those studies utilizing variables based on per capita youth population and accounting for fixed effects. The results of the Jarosz and Stephens (1999) are reported in the “Other Studies” column of Table 4.6. Jarosz and Stephens (1999) found the unemployment rate to be “positive and statistically significant with an elasticity of 0.04” in model estimates based on RSS-equivelant data. This is a difference of less than one-tenth of a percentage point of the estimate in the primary model of this thesis (per capita with fixed effects) estimated in this study.

7. Summary of Military-to-Civilian Pay Effects

The military-to-civilian pay ratio coefficient was not statistically significant at less than the .12 level in any variants of the primary model but was always positive. As seen in Table 4.7, the elasticity from the primary model in Table 4.1 indicates a 10% change in the military to civilian pay ratio would result in a 10.08% change in high quality male contracts.

Model	Description	Military-to-Civilian Pay Ratio Elasticity	Other Studies
Per Capita Model, W/RSS Fixed Effects Table 4.1	Marine Recruiters/per capita, DoD Recruiters/per capita, Unemployment Rate, Military Civilian Pay Ratio, RSS, Year, QTR	1.0080	N/A
Per Capita Model, W/O RSS Fixed Effects Table 4.2	Marine Recruiters/per capita, DoD Recruiters/per capita, Unemployment Rate, Military Civilian Pay Ratio	.0683	2.56 (a)
Total Contracts Model, W/Fixed Effects Table 4.3	Marine Recruiters, DoD Recruiters, Youth Population, Unemployment Rate, Military Civilian Pay Ratio, RSS, Year, Qtr	5.9743	N/A
Total Contracts Model, W/O Fixed Effects Table 4.4	Marine Recruiters, DoD Recruiters, Youth Population, Unemployment Rate, Military Civilian Pay Ratio	0.5126	N/A

(a) Warner (1990)

Table 4.7 Summary of Effects of the Military-to-Civilian Pay Ratio

(* significant at 10%, ** significant at 5%, *** Significant at 1%)

Warner's (1990) report estimated a 10% change in relative pay equates to a 5% to 25% change in high quality enlistments, dependent upon branch of service. The results found in this thesis are clearly within this range but are found to be less than the 25% for the Marine Corps that Warner's study found.

8. Summary of Other DoD Recruiter Effects

Table 4.8 displays the effects of non-Marine Corps recruiters on Marine recruiting. The coefficients of other service recruiters finds that a 10% change in other service recruiters results in a -.05% to 0.34% increase in Marine high quality male contract production depending on model specification. Of the four models specified, only those modes including RSS fixed effects were found to be statistically significant at the 10% level or better.

Model	Description	Other DoD Recruiters Elasticity	Other Studies
Per Capita Model, W/RSS Fixed Effects Table 4.1	Marine Recruiters/per capita, DoD Recruiters/per capita, Unemployment Rate, Military Civilian Pay Ratio, RSS, Year, QTR	0.0336	.03(a)
Per Capita Model, W/O RSS Fixed Effects Table 4.2	Marine Recruiters/per capita, DoD Recruiters/per capita, Unemployment Rate, Military Civilian Pay Ratio	0.0316***	N/A
Total Contracts Model, W/Fixed Effects Table 4.3	Marine Recruiters, DoD Recruiters, Youth Population, Unemployment Rate, Military Civilian Pay Ratio, RSS, Year, Qtr	-0.0151	.1692 (b)
Total Contracts Model, W/O Fixed Effects Table 4.4	Marine Recruiters, DoD Recruiters, Youth Population, Unemployment Rate, Military Civilian Pay Ratio	0.0203*	N/A

(a) Hogan et al. (2000) (b) Jarosz and Stephens (1999)

Table 4.8 Summary of Other DoD Recruiters Effects

(* significant at 10%, ** significant at 5%, *** Significant at 1%)

Although the estimated effect is small it supports the findings of other studies (Jarosz and Stephens, 1999; Warner, 1990; Hogan et al, 2000) that a cooperative effect of services recruiting within the same area is present rather than a competitive effect as may be expected. For

example, Jarosz and Stephens (1999) reported a 10% increase in Army recruiters operating within the same local market increases Navy high quality male contract production by 2% to 3.2%. Hogan et al.(2000) reported a 10% increase in Navy recruiters operating in the same zip code as an Army recruiting station increased Army high quality male contract production by 0.3%. Both of these studies support the concept of complimentary efforts among recruiters of various branches of service. The positive effects of Army recruiter levels on Navy contracts produced may be explained by the Navy serving as an alternative service for those who desire to enlist but would prefer to be removed from what is perceived as a front line infantry service. If the Navy serves as an alternative to the Army for service selection but not vice versa then the elasticity found within this study is identical to that of the Hogan et al. (2000) study.

E. CHAPTER SUMMARY

In summary, it appears that the effects of Marine recruiters are robust to the alternative specifications. The effects of some of the other variables, however, appear to be sensitive to model specification. In particular, the effects of the local unemployment rate and the military-to-civilian pay variable were highly sensitive to the particular model specification.

Four primary specifications of the basic enlistment supply model were estimated in this thesis. The estimated effects of the unemployment rate, military-to-civilian pay ratio and other service recruiters were found to be commensurate with the findings of past studies. The results of Marine recruiters on high quality male contract

production were estimated to be nearly twice those of studies examining other service recruiters. It is possible that these results reflect the smaller number of Marine Recruiting Sub Stations in comparison to the total number of stations maintained by other services. The concentration of recruiting efforts while still setting goaling levels similar to other services may have resulted in each Marine recruiter having a larger increased effect on Marine high quality male contact production. Full Fixed Effects results for the model in Table 4.1 are located in the Appendix.

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V. CONCLUSIONS AND RECOMMENDATIONS

This chapter provides a summary of research findings in this thesis and compares these results to those in the prior literature on enlistment supply models. Additionally, strengths and weaknesses of the model developed in this thesis are reviewed. Suggested model implementation by Marine Corps Recruiting Command (MCRC) and follow on research recommendations are also introduced.

A. CONCLUSIONS

In this thesis I estimated high quality male contract supply models for the Marine Corps on data disaggregated to the Recruiting Sub Station level. Model estimations were based on data covering 18 fiscal year quarters from 2003 through 2007, which yielded 10,799 observations. The model specifications used a log-log functional form and stressed the fixed effects estimates. The effects of local economic factors, local area demographics, and the allocation of recruiting resources (in the form of recruiters) on high quality male contract production were analyzed.

The primary model results were in line with expectations with coefficients that, in most cases, were similar to those from prior studies reviewed in the literature review chapter. The unemployment rate and own-service recruiter variables were generally statistically significant and, in particular, the estimated unemployment rate coefficient was very similar to that found in prior studies which used data at a local market level (Jarosz and Stephens, 1999). A noticeable increase in contract production is estimated from the first to the third quarter

of the fiscal year and is as expected based on shipping cycles for basic training. The own-service recruiter variable (USMC recruiter) had an estimated coefficient that was at least twice the size of that variable in previous studies (Warner, 1990). This variation may be explained by the fact that Marine recruiters tend to be concentrated in fewer recruiting facilities (Recruiting Sub Stations) than the other services, but must maintain a high new contract production quota.

The effect of the military-to-civilian pay ratio was positive as expected, based on the findings of previous studies (Warner, 1990), but the coefficient was only weakly significant (at the .12 level). Furthermore, the other-service recruiter variable (DoD recruiter) had a positive coefficient in the primary model, suggesting that the effect of other DoD recruiters working in the same local market area was complimentary, a result that also has been found in prior studies (Hogan et al., 2000).

In reviewing the strengths and weaknesses of the primary model developed for this research it is important to note that no previous model existed for the Marine Corps. As such, this research provides a baseline for future studies. The data set established for this base of research is very extensive, covering 18 quarters over a five-year period. Additionally, the data is disaggregated to the local market level, with the exception of civilian wages and the veteran population. The estimated coefficients of many of the independent variables lie within the range of findings from previous studies (Warner, 1990; Jarosz and Stephens, 1999; Hogan et al., 2000).

A key weakness of the model lies within the limited initial pool of variables that were readily available. An example is the inability of the model to capture a variable that accurately represents the propensity of youth to enlist. In addition, the veteran population variable was based on 2000 Census data and thus had no variation over time and had to be dropped from the model. Additionally, the civilian youth wage variable was based on state level manufacturing wages. Unfortunately, the manufacturing wage is based on the average salary of all workers within the manufacturing industry for a given state, not just the entry level manufacturing worker. Utilizing the state level manufacturing wage as a proxy for the civilian youth wage likely overestimates the opportunity wages available to the targeted youth population. Another problem is that the model in its current form is not readily usable by MCRC and would require an analyst with some form of regression analysis understanding to update, maintain, and interpret the models results for future use.

Despite these weaknesses, there are still potentially beneficial uses of the model for the Marine Corps. The model can be used to predict high quality male contract production when local market factors affecting Recruiter Sub Station production change. Coefficient estimates on the unemployment rate produced by the model were in the range found in prior studies that examined the same local market level (Jarosz and Stephens, 1999). As unemployment rates over time adjust the expected contract production level for given Recruiting Sub Stations can also be adjusted to establish local recruitment goals that are adjusted for the local economy. The model can also be used as a tool to examine whether

accurate contract levels are being assigned to Regions, Districts, Recruiting Stations, and Recruiting Sub Stations based on model estimates of contract production levels.

As a resource allocation tool the model can be used to determine local area effects of adjusting recruiter levels. This process would enable MCRC to target limited recruiting assets to regions that are predicted to produce more high quality male contracts in the future, therefore maximizing production per recruiter levels. As additional variables are added to the model their estimated effects could be used in a similar fashion to target resources to high yield regions or reallocate resources throughout the Marine Corps recruiting regions. A cost-effectiveness analysis of various recruitment resources can also be derived from the model assisting with decisions involving resource investment.

B. RECOMMENDATIONS

Enhancing the model developed in this study by adding relevant predictors of contract production variables found in other prior studies, would enable a more accurate estimation of high quality male contract production at the Recruiting Sub Station level for the Marine Corps. Establishing a more accurate youth wage estimator would benefit the model and likely provide a better estimate of changes to the military-to civilian wage variable. As military service may be the first full time job that many youth enlisting in service have ever had, the use of median family income by county may serve as a more accurate estimator of civilian wages than the manufacturing wage. Such a variable may also serve a secondary benefit of

providing an indication of the economic background of those who are likely to enlist and enable marketing resources to be distributed accordingly.

Further breakdown of existing variables such as by age and race of the male population also may provide additional insight into local demographics that may be beneficial in assigning contract goals to the Recruiting Station and Recruiting Sub Station levels. Additionally, conducting a cost-effectiveness analysis to determine which resources provide the most new contract production per dollar has great benefit in budget decisions concerning recruitment resource investment and allocation.

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APPENDIX

Source	SS	df	MS	Number of obs	=	10702.0000
				F(611, 10090)	=	25.3900
Model	78.8384	611.0000	0.1290	Prob > F	=	0.0000
Residual	51.2808	10090.0000	0.0051	R-squared	=	0.6059
				Adj R-squared	=	0.5820
Total	130.1192	10701.0000	0.0122	Root MSE	=	0.0713

log_USMC male contracts/per capita	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
log_USMC recruiter/per capita	0.8626	0.0152	56.7000	0.0000	0.8328	0.8924
log_DoD recruiter/per capita	0.0336	0.0231	1.4600	0.1460	-0.0117	0.0788
log_ur	0.0324	0.0079	4.0800	0.0000	0.0168	0.0479
log_milciv pay ratio	1.0080	0.6490	1.5500	0.1200	-0.2641	2.2801
_IRSS_2	-0.0936	0.0241	-3.8900	0.0000	-0.1408	-0.0465
_IRSS_3	-0.0609	0.0249	-2.4500	0.0140	-0.1096	-0.0121
_IRSS_4	-0.0796	0.0269	-2.9600	0.0030	-0.1323	-0.0270
_IRSS_5	-0.0502	0.0242	-2.0700	0.0390	-0.0977	-0.0026
_IRSS_6	-0.0385	0.0259	-1.4800	0.1380	-0.0893	0.0123
_IRSS_7	-0.0864	0.0306	-2.8200	0.0050	-0.1464	-0.0263
_IRSS_8	-0.0581	0.0306	-1.9000	0.0580	-0.1181	0.0020
_IRSS_9	-0.1054	0.0263	-4.0100	0.0000	-0.1570	-0.0538
_IRSS_10	-0.0397	0.0275	-1.4500	0.1480	-0.0935	0.0141
_IRSS_11	-0.0770	0.0257	-3.0000	0.0030	-0.1274	-0.0267
_IRSS_12	-0.0238	0.0281	-0.8500	0.3970	-0.0790	0.0313
_IRSS_13	-0.0385	0.0242	-1.5900	0.1120	-0.0861	0.0090
_IRSS_14	-0.0323	0.0241	-1.3400	0.1800	-0.0795	0.0150
_IRSS_15	-0.0079	0.0257	-0.3100	0.7590	-0.0584	0.0426
_IRSS_16	-0.0378	0.0372	-1.0200	0.3100	-0.1107	0.0351
_IRSS_17	-0.0331	0.0247	-1.3400	0.1800	-0.0815	0.0153
_IRSS_18	-0.0500	0.0275	-1.8100	0.0700	-0.1040	0.0040
_IRSS_19	-0.0393	0.0282	-1.3900	0.1650	-0.0946	0.0161
_IRSS_20	-0.0624	0.0264	-2.3600	0.0180	-0.1141	-0.0107
_IRSS_21	-0.0656	0.0269	-2.4400	0.0150	-0.1182	-0.0129
_IRSS_22	-0.0372	0.0249	-1.5000	0.1350	-0.0860	0.0115
_IRSS_23	0.0087	0.0246	0.3500	0.7230	-0.0394	0.0569
_IRSS_24	-0.0185	0.0268	-0.6900	0.4910	-0.0710	0.0341
_IRSS_25	-0.0194	0.0291	-0.6700	0.5030	-0.0764	0.0375
_IRSS_26	-0.0894	0.0258	-3.4600	0.0010	-0.1401	-0.0388

_IRSS_27	-0.0332	0.0270	-1.2300	0.2180	-0.0861	0.0196
_IRSS_28	-0.0433	0.0253	-1.7100	0.0870	-0.0930	0.0063
_IRSS_29	-0.0130	0.0246	-0.5300	0.5960	-0.0612	0.0351
_IRSS_30	0.0135	0.0244	0.5500	0.5810	-0.0343	0.0612
_IRSS_31	-0.0395	0.0257	-1.5400	0.1250	-0.0900	0.0109
_IRSS_32	-0.0542	0.0252	-2.1500	0.0320	-0.1037	-0.0047
_IRSS_33	-0.0657	0.0301	-2.1900	0.0290	-0.1247	-0.0068
_IRSS_34	-0.0477	0.0248	-1.9200	0.0550	-0.0963	0.0009
_IRSS_35	-0.0345	0.0246	-1.4100	0.1600	-0.0827	0.0136
_IRSS_36	-0.0371	0.0266	-1.3900	0.1630	-0.0893	0.0151
_IRSS_37	0.0011	0.0244	0.0500	0.9630	-0.0467	0.0490
_IRSS_38	-0.0223	0.0247	-0.9000	0.3680	-0.0708	0.0262
_IRSS_39	-0.0941	0.0258	-3.6500	0.0000	-0.1448	-0.0435
_IRSS_40	-0.0212	0.0251	-0.8500	0.3980	-0.0704	0.0280
_IRSS_41	-0.0537	0.0241	-2.2300	0.0260	-0.1010	-0.0065
_IRSS_42	0.0017	0.0262	0.0700	0.9470	-0.0495	0.0530
_IRSS_43	-0.0376	0.0245	-1.5300	0.1250	-0.0857	0.0105
_IRSS_44	-0.0184	0.0282	-0.6500	0.5140	-0.0737	0.0369
_IRSS_45	-0.0480	0.0273	-1.7600	0.0790	-0.1015	0.0055
_IRSS_46	-0.0398	0.0255	-1.5600	0.1190	-0.0899	0.0102
_IRSS_47	-0.0535	0.0369	-1.4500	0.1470	-0.1258	0.0189
_IRSS_48	-0.0680	0.0242	-2.8100	0.0050	-0.1154	-0.0206
_IRSS_49	-0.0470	0.0282	-1.6700	0.0950	-0.1022	0.0082
_IRSS_50	-0.0357	0.0322	-1.1100	0.2680	-0.0989	0.0275
_IRSS_51	-0.0569	0.0269	-2.1200	0.0340	-0.1096	-0.0042
_IRSS_52	-0.0218	0.0252	-0.8700	0.3860	-0.0711	0.0275
_IRSS_53	-0.0344	0.0247	-1.3900	0.1640	-0.0828	0.0140
_IRSS_54	-0.0147	0.0248	-0.5900	0.5530	-0.0632	0.0339
_IRSS_55	-0.0315	0.0289	-1.0900	0.2750	-0.0881	0.0251
_IRSS_56	-0.0472	0.0261	-1.8100	0.0700	-0.0984	0.0039
_IRSS_57	-0.1007	0.0255	-3.9500	0.0000	-0.1506	-0.0507
_IRSS_58	-0.0101	0.0271	-0.3700	0.7090	-0.0632	0.0430
_IRSS_59	-0.0385	0.0277	-1.3900	0.1640	-0.0928	0.0157
_IRSS_60	-0.0694	0.0269	-2.5800	0.0100	-0.1221	-0.0168
_IRSS_61	-0.0558	0.0269	-2.0800	0.0380	-0.1085	-0.0031
_IRSS_62	0.0137	0.0265	0.5200	0.6060	-0.0383	0.0657
_IRSS_63	-0.0368	0.0266	-1.3800	0.1670	-0.0890	0.0154
_IRSS_64	-0.0875	0.0261	-3.3600	0.0010	-0.1385	-0.0364
_IRSS_65	-0.0863	0.0270	-3.1900	0.0010	-0.1393	-0.0334
_IRSS_66	-0.0421	0.0261	-1.6100	0.1070	-0.0934	0.0091

_IRSS_67	0.0154	0.0269	0.5700	0.5670	-0.0373	0.0681
_IRSS_68	-0.0335	0.0260	-1.2900	0.1980	-0.0844	0.0175
_IRSS_69	-0.0980	0.0251	-3.9100	0.0000	-0.1472	-0.0489
_IRSS_70	-0.0155	0.0241	-0.6400	0.5220	-0.0628	0.0319
_IRSS_71	-0.0567	0.0281	-2.0200	0.0430	-0.1117	-0.0017
_IRSS_72	0.1068	0.0265	4.0300	0.0000	0.0549	0.1588
_IRSS_73	-0.0708	0.0261	-2.7200	0.0070	-0.1219	-0.0197
_IRSS_74	-0.0402	0.0262	-1.5300	0.1250	-0.0916	0.0112
_IRSS_75	-0.0667	0.0241	-2.7700	0.0060	-0.1139	-0.0195
_IRSS_76	-0.0428	0.0256	-1.6700	0.0950	-0.0930	0.0074
_IRSS_77	-0.0887	0.0280	-3.1600	0.0020	-0.1437	-0.0337
_IRSS_78	-0.0237	0.0328	-0.7200	0.4690	-0.0879	0.0405
_IRSS_79	-0.0449	0.0255	-1.7600	0.0780	-0.0948	0.0050
_IRSS_80	-0.0700	0.0266	-2.6300	0.0090	-0.1221	-0.0178
_IRSS_81	-0.0475	0.0265	-1.7900	0.0740	-0.0995	0.0045
_IRSS_82	-0.0265	0.0257	-1.0300	0.3030	-0.0769	0.0239
_IRSS_83	-0.0856	0.0279	-3.0600	0.0020	-0.1404	-0.0308
_IRSS_84	-0.0396	0.0254	-1.5600	0.1190	-0.0893	0.0101
_IRSS_85	-0.0399	0.0241	-1.6500	0.0980	-0.0872	0.0074
_IRSS_86	-0.0145	0.0248	-0.5800	0.5590	-0.0632	0.0341
_IRSS_87	0.0065	0.0280	0.2300	0.8150	-0.0483	0.0614
_IRSS_88	-0.0544	0.0242	-2.2500	0.0250	-0.1017	-0.0070
_IRSS_89	-0.0457	0.0279	-1.6400	0.1010	-0.1004	0.0090
_IRSS_90	-0.0425	0.0278	-1.5300	0.1260	-0.0969	0.0119
_IRSS_91	-0.0435	0.0268	-1.6300	0.1040	-0.0960	0.0089
_IRSS_92	-0.1870	0.0279	-6.7100	0.0000	-0.2416	-0.1323
_IRSS_93	-0.1451	0.0341	-4.2600	0.0000	-0.2119	-0.0783
_IRSS_94	-0.0149	0.0245	-0.6100	0.5440	-0.0628	0.0331
_IRSS_95	-0.0915	0.0254	-3.6000	0.0000	-0.1413	-0.0418
_IRSS_96	-0.0287	0.0251	-1.1400	0.2540	-0.0779	0.0206
_IRSS_97	-0.0573	0.0247	-2.3200	0.0200	-0.1058	-0.0089
_IRSS_98	0.0229	0.0253	0.9000	0.3660	-0.0268	0.0725
_IRSS_99	-0.0469	0.0248	-1.8900	0.0580	-0.0955	0.0017
_IRSS_100	-0.0176	0.0256	-0.6900	0.4910	-0.0678	0.0326
_IRSS_101	-0.0767	0.0252	-3.0500	0.0020	-0.1260	-0.0273
_IRSS_102	-0.0512	0.0264	-1.9400	0.0520	-0.1030	0.0005
_IRSS_103	-0.0362	0.0279	-1.3000	0.1950	-0.0910	0.0185
_IRSS_104	-0.0549	0.0262	-2.1000	0.0360	-0.1061	-0.0036
_IRSS_105	-0.0420	0.0258	-1.6300	0.1030	-0.0925	0.0085
_IRSS_106	-0.0117	0.0273	-0.4300	0.6680	-0.0653	0.0418

_IRSS_107	-0.0892	0.0283	-3.1500	0.0020	-0.1447	-0.0337
_IRSS_108	0.0195	0.0247	0.7900	0.4290	-0.0288	0.0679
_IRSS_109	0.0155	0.0239	0.6500	0.5190	-0.0315	0.0624
_IRSS_110	-0.0657	0.0253	-2.6000	0.0090	-0.1153	-0.0161
_IRSS_111	-0.0962	0.0270	-3.5500	0.0000	-0.1492	-0.0431
_IRSS_112	-0.0637	0.0268	-2.3700	0.0180	-0.1163	-0.0111
_IRSS_113	-0.0378	0.0243	-1.5500	0.1200	-0.0855	0.0099
_IRSS_114	-0.0782	0.0276	-2.8300	0.0050	-0.1324	-0.0240
_IRSS_115	-0.0087	0.0263	-0.3300	0.7420	-0.0603	0.0430
_IRSS_116	-0.0682	0.0257	-2.6500	0.0080	-0.1186	-0.0178
_IRSS_117	-0.0463	0.0269	-1.7200	0.0850	-0.0990	0.0064
_IRSS_118	-0.0372	0.0245	-1.5200	0.1290	-0.0853	0.0109
_IRSS_119	-0.0367	0.0241	-1.5300	0.1270	-0.0840	0.0105
_IRSS_120	-0.0283	0.0262	-1.0800	0.2800	-0.0797	0.0231
_IRSS_121	-0.0322	0.0257	-1.2600	0.2090	-0.0826	0.0181
_IRSS_122	-0.1105	0.0265	-4.1600	0.0000	-0.1626	-0.0585
_IRSS_123	-0.0252	0.0252	-1.0000	0.3180	-0.0745	0.0242
_IRSS_124	-0.0446	0.0245	-1.8200	0.0680	-0.0927	0.0034
_IRSS_125	-0.1073	0.0272	-3.9400	0.0000	-0.1606	-0.0540
_IRSS_126	-0.0430	0.0248	-1.7300	0.0840	-0.0917	0.0057
_IRSS_127	-0.0128	0.0272	-0.4700	0.6390	-0.0662	0.0406
_IRSS_128	-0.0927	0.0264	-3.5200	0.0000	-0.1443	-0.0410
_IRSS_129	-0.0995	0.0285	-3.4900	0.0000	-0.1555	-0.0436
_IRSS_130	-0.0323	0.0253	-1.2700	0.2020	-0.0819	0.0173
_IRSS_131	-0.0007	0.0246	-0.0300	0.9770	-0.0489	0.0475
_IRSS_132	-0.0509	0.0260	-1.9600	0.0500	-0.1019	0.0001
_IRSS_133	-0.0800	0.0265	-3.0200	0.0030	-0.1319	-0.0280
_IRSS_134	-0.0578	0.0288	-2.0100	0.0450	-0.1142	-0.0013
_IRSS_135	-0.1595	0.0253	-6.3100	0.0000	-0.2090	-0.1099
_IRSS_136	0.0024	0.0266	0.0900	0.9290	-0.0497	0.0545
_IRSS_137	-0.0698	0.0277	-2.5200	0.0120	-0.1240	-0.0155
_IRSS_138	-0.0442	0.0286	-1.5500	0.1220	-0.1002	0.0118
_IRSS_139	-0.0389	0.0276	-1.4100	0.1580	-0.0929	0.0152
_IRSS_140	-0.0709	0.0247	-2.8700	0.0040	-0.1193	-0.0225
_IRSS_141	-0.0279	0.0245	-1.1400	0.2550	-0.0759	0.0201
_IRSS_142	-0.0866	0.0251	-3.4500	0.0010	-0.1358	-0.0374
_IRSS_143	-0.0988	0.0268	-3.6900	0.0000	-0.1513	-0.0463
_IRSS_144	-0.0053	0.0281	-0.1900	0.8490	-0.0603	0.0497
_IRSS_145	-0.0779	0.0244	-3.1900	0.0010	-0.1257	-0.0300
_IRSS_146	-0.0442	0.0251	-1.7600	0.0790	-0.0934	0.0050

_IRSS_147	0.0062	0.0264	0.2300	0.8150	-0.0456	0.0580
_IRSS_148	-0.0687	0.0270	-2.5400	0.0110	-0.1217	-0.0157
_IRSS_149	-0.0912	0.0253	-3.6000	0.0000	-0.1408	-0.0416
_IRSS_150	-0.0491	0.0251	-1.9500	0.0510	-0.0984	0.0002
_IRSS_151	-0.0348	0.0246	-1.4200	0.1570	-0.0830	0.0134
_IRSS_152	-0.0817	0.0247	-3.3100	0.0010	-0.1301	-0.0334
_IRSS_153	-0.0064	0.0264	-0.2400	0.8090	-0.0582	0.0454
_IRSS_154	-0.0228	0.0312	-0.7300	0.4650	-0.0838	0.0383
_IRSS_155	-0.0089	0.0241	-0.3700	0.7130	-0.0562	0.0384
_IRSS_156	-0.0362	0.0258	-1.4000	0.1600	-0.0867	0.0143
_IRSS_157	-0.0395	0.0249	-1.5900	0.1120	-0.0882	0.0092
_IRSS_158	-0.0374	0.0245	-1.5300	0.1270	-0.0854	0.0106
_IRSS_159	-0.0643	0.0251	-2.5600	0.0100	-0.1136	-0.0151
_IRSS_160	-0.0597	0.0260	-2.2900	0.0220	-0.1108	-0.0087
_IRSS_161	-0.0343	0.0260	-1.3200	0.1870	-0.0852	0.0166
_IRSS_162	-0.0164	0.0257	-0.6400	0.5240	-0.0668	0.0340
_IRSS_163	-0.0812	0.0296	-2.7400	0.0060	-0.1391	-0.0232
_IRSS_164	-0.0116	0.0253	-0.4600	0.6480	-0.0612	0.0381
_IRSS_165	-0.0472	0.0259	-1.8200	0.0690	-0.0980	0.0036
_IRSS_166	-0.0784	0.0259	-3.0300	0.0020	-0.1291	-0.0277
_IRSS_167	-0.0367	0.0251	-1.4700	0.1430	-0.0859	0.0124
_IRSS_168	-0.0476	0.0270	-1.7600	0.0780	-0.1004	0.0053
_IRSS_169	-0.0225	0.0249	-0.9000	0.3660	-0.0713	0.0263
_IRSS_170	-0.0134	0.0251	-0.5300	0.5930	-0.0626	0.0358
_IRSS_171	-0.0302	0.0257	-1.1800	0.2390	-0.0805	0.0201
_IRSS_172	-0.1416	0.0276	-5.1300	0.0000	-0.1956	-0.0875
_IRSS_174	-0.1624	0.0281	-5.7800	0.0000	-0.2175	-0.1074
_IRSS_175	-0.0621	0.0269	-2.3100	0.0210	-0.1149	-0.0094
_IRSS_176	-0.0739	0.0339	-2.1800	0.0290	-0.1404	-0.0075
_IRSS_177	-0.0873	0.0267	-3.2700	0.0010	-0.1397	-0.0350
_IRSS_178	-0.0296	0.0251	-1.1800	0.2390	-0.0787	0.0196
_IRSS_179	-0.0740	0.0250	-2.9600	0.0030	-0.1230	-0.0251
_IRSS_180	-0.0816	0.0254	-3.2100	0.0010	-0.1314	-0.0317
_IRSS_181	-0.0268	0.0251	-1.0700	0.2850	-0.0761	0.0224
_IRSS_182	-0.0403	0.0258	-1.5600	0.1190	-0.0909	0.0104
_IRSS_183	-0.1250	0.0271	-4.6100	0.0000	-0.1782	-0.0718
_IRSS_184	-0.0149	0.0261	-0.5700	0.5670	-0.0661	0.0362
_IRSS_185	0.0077	0.0253	0.3100	0.7590	-0.0418	0.0573
_IRSS_186	-0.0021	0.0243	-0.0900	0.9320	-0.0496	0.0455
_IRSS_187	-0.1062	0.0342	-3.1100	0.0020	-0.1732	-0.0392

_IRSS_188	-0.1732	0.0311	-5.5700	0.0000	-0.2342	-0.1123
_IRSS_189	-0.0812	0.0260	-3.1200	0.0020	-0.1323	-0.0302
_IRSS_190	-0.0167	0.0247	-0.6800	0.4980	-0.0650	0.0316
_IRSS_191	-0.0198	0.0247	-0.8000	0.4220	-0.0681	0.0286
_IRSS_192	-0.0196	0.0250	-0.7800	0.4340	-0.0686	0.0295
_IRSS_193	0.0142	0.0247	0.5800	0.5640	-0.0341	0.0626
_IRSS_194	-0.0614	0.0268	-2.2900	0.0220	-0.1140	-0.0088
_IRSS_195	-0.0546	0.0256	-2.1300	0.0330	-0.1048	-0.0044
_IRSS_196	-0.0317	0.0257	-1.2300	0.2180	-0.0821	0.0187
_IRSS_197	-0.0934	0.0279	-3.3500	0.0010	-0.1480	-0.0388
_IRSS_198	-0.0207	0.0272	-0.7600	0.4470	-0.0740	0.0326
_IRSS_199	-0.0350	0.0274	-1.2800	0.2010	-0.0887	0.0187
_IRSS_200	-0.0391	0.0255	-1.5400	0.1250	-0.0890	0.0108
_IRSS_201	-0.0352	0.0274	-1.2900	0.1990	-0.0889	0.0185
_IRSS_202	-0.0260	0.0272	-0.9600	0.3390	-0.0794	0.0273
_IRSS_203	-0.0269	0.0241	-1.1100	0.2660	-0.0742	0.0205
_IRSS_204	-0.0233	0.0284	-0.8200	0.4110	-0.0789	0.0323
_IRSS_205	-0.0960	0.0276	-3.4800	0.0010	-0.1501	-0.0419
_IRSS_206	-0.1477	0.0304	-4.8700	0.0000	-0.2072	-0.0883
_IRSS_207	-0.0089	0.0258	-0.3400	0.7310	-0.0594	0.0417
_IRSS_208	-0.0027	0.0245	-0.1100	0.9120	-0.0508	0.0454
_IRSS_209	-0.0912	0.0256	-3.5600	0.0000	-0.1413	-0.0410
_IRSS_210	-0.0349	0.0243	-1.4300	0.1510	-0.0825	0.0128
_IRSS_211	-0.0256	0.0254	-1.0100	0.3140	-0.0755	0.0243
_IRSS_212	-0.0373	0.0261	-1.4300	0.1530	-0.0885	0.0139
_IRSS_213	-0.0563	0.0258	-2.1800	0.0290	-0.1069	-0.0058
_IRSS_214	-0.0500	0.0270	-1.8500	0.0640	-0.1029	0.0029
_IRSS_215	-0.0799	0.0249	-3.2100	0.0010	-0.1287	-0.0310
_IRSS_216	-0.0599	0.0269	-2.2300	0.0260	-0.1126	-0.0072
_IRSS_217	-0.0356	0.0277	-1.2900	0.1990	-0.0898	0.0187
_IRSS_218	-0.0186	0.0251	-0.7400	0.4570	-0.0678	0.0305
_IRSS_220	-0.0875	0.0339	-2.5900	0.0100	-0.1539	-0.0212
_IRSS_221	-0.0259	0.0263	-0.9800	0.3250	-0.0774	0.0256
_IRSS_222	-0.0386	0.0251	-1.5400	0.1250	-0.0879	0.0107
_IRSS_223	-0.0453	0.0250	-1.8100	0.0700	-0.0943	0.0037
_IRSS_224	-0.0722	0.0267	-2.7000	0.0070	-0.1246	-0.0198
_IRSS_225	-0.1233	0.0343	-3.6000	0.0000	-0.1905	-0.0561
_IRSS_226	-0.0734	0.0277	-2.6500	0.0080	-0.1276	-0.0191
_IRSS_227	-0.0636	0.0369	-1.7300	0.0850	-0.1358	0.0087
_IRSS_228	-0.0642	0.0250	-2.5600	0.0100	-0.1133	-0.0151

_IRSS_229	-0.0156	0.0320	-0.4900	0.6270	-0.0783	0.0472
_IRSS_230	-0.0675	0.0269	-2.5100	0.0120	-0.1203	-0.0147
_IRSS_231	-0.0408	0.0254	-1.6000	0.1090	-0.0907	0.0091
_IRSS_232	-0.0286	0.0256	-1.1200	0.2640	-0.0789	0.0216
_IRSS_233	-0.1043	0.0253	-4.1200	0.0000	-0.1539	-0.0547
_IRSS_234	-0.0318	0.0285	-1.1200	0.2640	-0.0877	0.0240
_IRSS_235	-0.0752	0.0430	-1.7500	0.0800	-0.1595	0.0091
_IRSS_236	-0.0794	0.0244	-3.2500	0.0010	-0.1273	-0.0315
_IRSS_237	-0.1017	0.0259	-3.9300	0.0000	-0.1524	-0.0509
_IRSS_238	-0.0684	0.0247	-2.7700	0.0060	-0.1169	-0.0200
_IRSS_239	-0.0625	0.0249	-2.5000	0.0120	-0.1114	-0.0136
_IRSS_240	-0.0081	0.0258	-0.3200	0.7530	-0.0587	0.0425
_IRSS_241	-0.0286	0.0248	-1.1500	0.2490	-0.0773	0.0201
_IRSS_242	-0.0498	0.0263	-1.8900	0.0580	-0.1013	0.0017
_IRSS_243	-0.0534	0.0284	-1.8800	0.0600	-0.1091	0.0023
_IRSS_244	-0.0368	0.0285	-1.2900	0.1970	-0.0926	0.0191
_IRSS_245	-0.1224	0.0264	-4.6400	0.0000	-0.1741	-0.0708
_IRSS_246	-0.0139	0.0271	-0.5100	0.6090	-0.0670	0.0392
_IRSS_247	-0.0045	0.0240	-0.1900	0.8530	-0.0514	0.0425
_IRSS_248	-0.0582	0.0261	-2.2300	0.0260	-0.1094	-0.0071
_IRSS_249	-0.0910	0.0316	-2.8800	0.0040	-0.1530	-0.0290
_IRSS_250	-0.0950	0.0270	-3.5300	0.0000	-0.1478	-0.0422
_IRSS_251	-0.0448	0.0274	-1.6300	0.1030	-0.0986	0.0090
_IRSS_252	-0.0535	0.0273	-1.9600	0.0500	-0.1070	0.0000
_IRSS_253	-0.0236	0.0266	-0.8900	0.3740	-0.0757	0.0285
_IRSS_254	-0.0669	0.0251	-2.6700	0.0080	-0.1160	-0.0178
_IRSS_255	-0.1384	0.0246	-5.6300	0.0000	-0.1866	-0.0902
_IRSS_256	-0.0420	0.0272	-1.5400	0.1230	-0.0953	0.0114
_IRSS_257	-0.0393	0.0260	-1.5100	0.1310	-0.0902	0.0117
_IRSS_258	-0.0426	0.0262	-1.6200	0.1040	-0.0940	0.0088
_IRSS_259	-0.1134	0.0269	-4.2100	0.0000	-0.1662	-0.0607
_IRSS_260	-0.1089	0.0253	-4.3000	0.0000	-0.1585	-0.0592
_IRSS_261	-0.0416	0.0259	-1.6000	0.1090	-0.0925	0.0092
_IRSS_262	-0.0938	0.0339	-2.7600	0.0060	-0.1604	-0.0273
_IRSS_263	-0.0397	0.0274	-1.4500	0.1470	-0.0933	0.0139
_IRSS_264	-0.0406	0.0262	-1.5500	0.1220	-0.0920	0.0108
_IRSS_265	-0.0293	0.0249	-1.1800	0.2390	-0.0781	0.0195
_IRSS_266	0.0041	0.0249	0.1600	0.8690	-0.0447	0.0529
_IRSS_267	-0.0178	0.0263	-0.6800	0.4980	-0.0694	0.0337
_IRSS_268	-0.0657	0.0316	-2.0800	0.0380	-0.1277	-0.0036

_IRSS_269	-0.0284	0.0280	-1.0100	0.3110	-0.0832	0.0265
_IRSS_270	-0.0476	0.0276	-1.7200	0.0850	-0.1018	0.0066
_IRSS_271	-0.0649	0.0280	-2.3200	0.0200	-0.1197	-0.0100
_IRSS_272	-0.0641	0.0242	-2.6500	0.0080	-0.1115	-0.0167
_IRSS_273	-0.0132	0.0280	-0.4700	0.6390	-0.0681	0.0418
_IRSS_274	-0.0565	0.0270	-2.0900	0.0360	-0.1094	-0.0036
_IRSS_275	-0.0327	0.0248	-1.3200	0.1880	-0.0813	0.0160
_IRSS_276	-0.0405	0.0263	-1.5400	0.1230	-0.0921	0.0110
_IRSS_277	-0.0101	0.0259	-0.3900	0.6960	-0.0609	0.0406
_IRSS_278	0.0068	0.0251	0.2700	0.7860	-0.0423	0.0559
_IRSS_279	-0.0745	0.0247	-3.0100	0.0030	-0.1230	-0.0260
_IRSS_280	-0.0715	0.0245	-2.9200	0.0040	-0.1195	-0.0235
_IRSS_281	-0.0373	0.0251	-1.4900	0.1370	-0.0866	0.0119
_IRSS_282	-0.0067	0.0246	-0.2700	0.7850	-0.0550	0.0415
_IRSS_283	-0.0177	0.0271	-0.6500	0.5140	-0.0708	0.0354
_IRSS_284	-0.0434	0.0257	-1.6900	0.0910	-0.0937	0.0069
_IRSS_285	-0.0667	0.0249	-2.6800	0.0070	-0.1155	-0.0180
_IRSS_286	-0.0278	0.0260	-1.0700	0.2850	-0.0788	0.0232
_IRSS_287	-0.1181	0.0275	-4.3000	0.0000	-0.1719	-0.0643
_IRSS_288	-0.0297	0.0268	-1.1100	0.2680	-0.0822	0.0228
_IRSS_289	-0.0646	0.0304	-2.1200	0.0340	-0.1241	-0.0050
_IRSS_290	-0.0673	0.0280	-2.4000	0.0160	-0.1221	-0.0124
_IRSS_291	-0.0011	0.0261	-0.0400	0.9660	-0.0522	0.0500
_IRSS_292	-0.0884	0.0291	-3.0300	0.0020	-0.1455	-0.0313
_IRSS_293	-0.0056	0.0272	-0.2100	0.8370	-0.0590	0.0478
_IRSS_294	-0.0064	0.0251	-0.2600	0.7980	-0.0556	0.0428
_IRSS_295	-0.0415	0.0266	-1.5600	0.1190	-0.0938	0.0107
_IRSS_296	-0.0531	0.0282	-1.8800	0.0600	-0.1084	0.0021
_IRSS_297	-0.0177	0.0248	-0.7100	0.4750	-0.0663	0.0309
_IRSS_298	-0.0735	0.0315	-2.3300	0.0200	-0.1354	-0.0117
_IRSS_299	-0.0234	0.0254	-0.9200	0.3560	-0.0732	0.0263
_IRSS_300	-0.0963	0.0338	-2.8500	0.0040	-0.1625	-0.0300
_IRSS_301	-0.0149	0.0259	-0.5700	0.5650	-0.0656	0.0358
_IRSS_302	-0.0284	0.0260	-1.0900	0.2740	-0.0794	0.0225
_IRSS_303	-0.0434	0.0255	-1.7000	0.0900	-0.0934	0.0067
_IRSS_304	0.0182	0.0244	0.7400	0.4560	-0.0297	0.0661
_IRSS_305	-0.0214	0.0261	-0.8200	0.4120	-0.0725	0.0297
_IRSS_306	-0.0435	0.0269	-1.6200	0.1060	-0.0962	0.0092
_IRSS_307	-0.0725	0.0269	-2.7000	0.0070	-0.1252	-0.0198
_IRSS_308	-0.0029	0.0240	-0.1200	0.9040	-0.0499	0.0441

_IRSS_309	-0.0291	0.0245	-1.1900	0.2340	-0.0771	0.0189
_IRSS_310	-0.0584	0.0271	-2.1500	0.0310	-0.1115	-0.0052
_IRSS_311	-0.0262	0.0276	-0.9500	0.3420	-0.0803	0.0279
_IRSS_312	-0.0467	0.0260	-1.8000	0.0720	-0.0976	0.0042
_IRSS_313	0.0025	0.0260	0.1000	0.9230	-0.0485	0.0535
_IRSS_314	-0.0238	0.0267	-0.8900	0.3730	-0.0761	0.0286
_IRSS_315	-0.0740	0.0253	-2.9300	0.0030	-0.1235	-0.0244
_IRSS_316	-0.0222	0.0254	-0.8700	0.3830	-0.0719	0.0276
_IRSS_317	-0.0489	0.0252	-1.9400	0.0520	-0.0983	0.0004
_IRSS_318	-0.0535	0.0263	-2.0400	0.0420	-0.1050	-0.0021
_IRSS_319	-0.0626	0.0257	-2.4400	0.0150	-0.1130	-0.0123
_IRSS_320	-0.0601	0.0282	-2.1300	0.0330	-0.1154	-0.0047
_IRSS_321	-0.0447	0.0253	-1.7700	0.0770	-0.0942	0.0049
_IRSS_322	-0.1511	0.0260	-5.8000	0.0000	-0.2021	-0.1000
_IRSS_323	-0.0176	0.0252	-0.7000	0.4850	-0.0670	0.0318
_IRSS_324	-0.0612	0.0260	-2.3600	0.0180	-0.1122	-0.0103
_IRSS_325	-0.0374	0.0260	-1.4400	0.1500	-0.0884	0.0136
_IRSS_326	-0.0303	0.0255	-1.1900	0.2360	-0.0803	0.0198
_IRSS_327	0.0010	0.0254	0.0400	0.9690	-0.0488	0.0507
_IRSS_328	-0.0715	0.0272	-2.6300	0.0090	-0.1249	-0.0181
_IRSS_329	-0.0397	0.0251	-1.5800	0.1140	-0.0889	0.0095
_IRSS_330	-0.0313	0.0255	-1.2200	0.2210	-0.0813	0.0188
_IRSS_331	-0.1046	0.0344	-3.0400	0.0020	-0.1721	-0.0371
_IRSS_332	-0.0427	0.0248	-1.7200	0.0850	-0.0913	0.0059
_IRSS_333	-0.0139	0.0248	-0.5600	0.5760	-0.0626	0.0348
_IRSS_334	-0.0068	0.0244	-0.2800	0.7820	-0.0547	0.0411
_IRSS_335	-0.0111	0.0248	-0.4500	0.6540	-0.0597	0.0375
_IRSS_336	-0.0178	0.0251	-0.7100	0.4780	-0.0669	0.0314
_IRSS_337	-0.0238	0.0255	-0.9300	0.3510	-0.0737	0.0262
_IRSS_339	-0.0163	0.0246	-0.6600	0.5080	-0.0646	0.0320
_IRSS_340	-0.0247	0.0259	-0.9500	0.3410	-0.0755	0.0261
_IRSS_341	-0.0627	0.0243	-2.5800	0.0100	-0.1103	-0.0150
_IRSS_342	-0.1014	0.0293	-3.4600	0.0010	-0.1588	-0.0440
_IRSS_343	0.0128	0.0274	0.4700	0.6400	-0.0409	0.0665
_IRSS_344	-0.0133	0.0268	-0.5000	0.6200	-0.0658	0.0392
_IRSS_345	-0.0080	0.0257	-0.3100	0.7540	-0.0584	0.0423
_IRSS_346	-0.0520	0.0367	-1.4200	0.1560	-0.1239	0.0198
_IRSS_347	-0.0558	0.0279	-2.0000	0.0450	-0.1104	-0.0012
_IRSS_348	-0.0412	0.0253	-1.6300	0.1030	-0.0909	0.0084
_IRSS_349	-0.0544	0.0247	-2.2000	0.0280	-0.1028	-0.0060

_IRSS_350	-0.0879	0.0287	-3.0600	0.0020	-0.1441	-0.0317
_IRSS_351	-0.0319	0.0259	-1.2300	0.2180	-0.0827	0.0189
_IRSS_352	-0.0896	0.0262	-3.4100	0.0010	-0.1410	-0.0381
_IRSS_353	-0.0531	0.0279	-1.9000	0.0580	-0.1078	0.0017
_IRSS_354	-0.0309	0.0254	-1.2200	0.2240	-0.0808	0.0189
_IRSS_355	-0.0623	0.0242	-2.5800	0.0100	-0.1098	-0.0149
_IRSS_356	-0.0606	0.0249	-2.4400	0.0150	-0.1094	-0.0118
_IRSS_357	-0.0208	0.0260	-0.8000	0.4240	-0.0717	0.0302
_IRSS_358	-0.0110	0.0254	-0.4400	0.6630	-0.0608	0.0387
_IRSS_359	-0.0550	0.0269	-2.0500	0.0410	-0.1077	-0.0023
_IRSS_360	-0.0266	0.0253	-1.0500	0.2930	-0.0761	0.0230
_IRSS_361	-0.0918	0.0282	-3.2600	0.0010	-0.1471	-0.0366
_IRSS_362	-0.0380	0.0271	-1.4000	0.1610	-0.0911	0.0152
_IRSS_363	-0.0750	0.0271	-2.7700	0.0060	-0.1281	-0.0219
_IRSS_364	-0.0186	0.0288	-0.6500	0.5190	-0.0751	0.0379
_IRSS_365	-0.0428	0.0246	-1.7400	0.0820	-0.0910	0.0054
_IRSS_366	-0.0380	0.0274	-1.3900	0.1650	-0.0917	0.0156
_IRSS_367	-0.0261	0.0252	-1.0300	0.3010	-0.0756	0.0234
_IRSS_368	-0.0384	0.0265	-1.4500	0.1470	-0.0903	0.0135
_IRSS_369	-0.0522	0.0261	-2.0000	0.0450	-0.1033	-0.0011
_IRSS_370	-0.0616	0.0265	-2.3300	0.0200	-0.1135	-0.0097
_IRSS_371	-0.1341	0.0270	-4.9600	0.0000	-0.1872	-0.0811
_IRSS_372	-0.0211	0.0266	-0.7900	0.4270	-0.0733	0.0310
_IRSS_373	-0.0629	0.0255	-2.4600	0.0140	-0.1129	-0.0128
_IRSS_374	-0.0373	0.0253	-1.4700	0.1410	-0.0869	0.0124
_IRSS_375	-0.0320	0.0241	-1.3300	0.1840	-0.0793	0.0152
_IRSS_376	-0.0137	0.0259	-0.5300	0.5960	-0.0644	0.0370
_IRSS_377	-0.0211	0.0250	-0.8400	0.4000	-0.0702	0.0280
_IRSS_378	-0.0932	0.0279	-3.3400	0.0010	-0.1479	-0.0386
_IRSS_379	-0.0610	0.0262	-2.3300	0.0200	-0.1123	-0.0098
_IRSS_380	-0.0360	0.0249	-1.4400	0.1490	-0.0848	0.0129
_IRSS_381	0.0056	0.0255	0.2200	0.8250	-0.0444	0.0557
_IRSS_382	-0.0422	0.0277	-1.5200	0.1280	-0.0965	0.0122
_IRSS_383	-0.0587	0.0261	-2.2500	0.0240	-0.1098	-0.0077
_IRSS_384	-0.0368	0.0288	-1.2800	0.2010	-0.0932	0.0196
_IRSS_385	-0.0389	0.0245	-1.5900	0.1130	-0.0870	0.0092
_IRSS_386	-0.0270	0.0256	-1.0500	0.2920	-0.0772	0.0232
_IRSS_387	-0.0479	0.0252	-1.9000	0.0580	-0.0973	0.0016
_IRSS_388	-0.0808	0.0262	-3.0800	0.0020	-0.1322	-0.0293
_IRSS_389	-0.0527	0.0251	-2.0900	0.0360	-0.1019	-0.0034

_IRSS_390	-0.0546	0.0250	-2.1800	0.0290	-0.1036	-0.0056
_IRSS_391	-0.0532	0.0271	-1.9700	0.0490	-0.1063	-0.0002
_IRSS_392	-0.0885	0.0254	-3.4800	0.0000	-0.1382	-0.0387
_IRSS_393	-0.0496	0.0274	-1.8100	0.0700	-0.1033	0.0041
_IRSS_394	-0.0509	0.0252	-2.0200	0.0440	-0.1004	-0.0014
_IRSS_395	-0.0134	0.0243	-0.5500	0.5810	-0.0611	0.0342
_IRSS_396	-0.0820	0.0298	-2.7500	0.0060	-0.1405	-0.0236
_IRSS_397	-0.1245	0.0261	-4.7800	0.0000	-0.1756	-0.0734
_IRSS_398	-0.0552	0.0295	-1.8700	0.0620	-0.1131	0.0028
_IRSS_399	-0.0673	0.0298	-2.2600	0.0240	-0.1256	-0.0089
_IRSS_400	-0.0306	0.0261	-1.1700	0.2400	-0.0818	0.0205
_IRSS_401	-0.0650	0.0268	-2.4200	0.0160	-0.1175	-0.0124
_IRSS_402	-0.0497	0.0277	-1.7900	0.0730	-0.1039	0.0046
_IRSS_403	-0.0038	0.0245	-0.1500	0.8780	-0.0518	0.0443
_IRSS_404	-0.0599	0.0265	-2.2600	0.0240	-0.1118	-0.0080
_IRSS_405	-0.0575	0.0247	-2.3200	0.0200	-0.1060	-0.0090
_IRSS_406	-0.0487	0.0260	-1.8700	0.0610	-0.0995	0.0022
_IRSS_407	-0.0682	0.0261	-2.6100	0.0090	-0.1194	-0.0170
_IRSS_408	-0.0744	0.0256	-2.9000	0.0040	-0.1247	-0.0242
_IRSS_409	-0.0580	0.0273	-2.1200	0.0340	-0.1116	-0.0044
_IRSS_410	-0.0142	0.0254	-0.5600	0.5770	-0.0641	0.0357
_IRSS_411	0.0077	0.0259	0.3000	0.7660	-0.0431	0.0585
_IRSS_412	-0.1281	0.0253	-5.0700	0.0000	-0.1776	-0.0785
_IRSS_413	-0.0663	0.0264	-2.5100	0.0120	-0.1179	-0.0146
_IRSS_414	-0.0443	0.0247	-1.7900	0.0730	-0.0927	0.0041
_IRSS_415	-0.2148	0.0428	-5.0200	0.0000	-0.2987	-0.1309
_IRSS_416	-0.0395	0.0285	-1.3900	0.1650	-0.0953	0.0163
_IRSS_417	-0.0863	0.0272	-3.1700	0.0020	-0.1396	-0.0330
_IRSS_418	-0.0295	0.0244	-1.2100	0.2280	-0.0774	0.0184
_IRSS_419	0.2459	0.0339	7.2400	0.0000	0.1793	0.3124
_IRSS_420	-0.1055	0.0271	-3.9000	0.0000	-0.1586	-0.0524
_IRSS_421	-0.0577	0.0256	-2.2500	0.0240	-0.1079	-0.0075
_IRSS_422	-0.1107	0.0289	-3.8400	0.0000	-0.1673	-0.0542
_IRSS_423	-0.1270	0.0340	-3.7400	0.0000	-0.1937	-0.0604
_IRSS_424	-0.0184	0.0246	-0.7500	0.4530	-0.0666	0.0298
_IRSS_425	-0.0069	0.0260	-0.2700	0.7910	-0.0578	0.0440
_IRSS_426	-0.0690	0.0267	-2.5900	0.0100	-0.1213	-0.0167
_IRSS_427	-0.0327	0.0259	-1.2600	0.2070	-0.0836	0.0181
_IRSS_428	-0.0166	0.0274	-0.6100	0.5450	-0.0702	0.0371
_IRSS_429	-0.0271	0.0246	-1.1000	0.2710	-0.0752	0.0211

_IRSS_430	-0.0349	0.0256	-1.3600	0.1730	-0.0852	0.0153
_IRSS_431	-0.0514	0.0281	-1.8300	0.0680	-0.1065	0.0037
_IRSS_432	-0.0255	0.0303	-0.8400	0.4010	-0.0849	0.0339
_IRSS_433	-0.0256	0.0243	-1.0600	0.2910	-0.0732	0.0220
_IRSS_434	-0.0527	0.0278	-1.9000	0.0580	-0.1072	0.0017
_IRSS_435	-0.0438	0.0272	-1.6100	0.1070	-0.0971	0.0095
_IRSS_436	-0.0968	0.0253	-3.8300	0.0000	-0.1464	-0.0472
_IRSS_437	-0.0048	0.0295	-0.1600	0.8700	-0.0627	0.0530
_IRSS_438	-0.0618	0.0263	-2.3500	0.0190	-0.1133	-0.0102
_IRSS_439	-0.0312	0.0281	-1.1100	0.2660	-0.0863	0.0238
_IRSS_440	-0.0545	0.0342	-1.5900	0.1120	-0.1216	0.0127
_IRSS_441	-0.0562	0.0253	-2.2200	0.0260	-0.1058	-0.0066
_IRSS_442	-0.0084	0.0259	-0.3200	0.7460	-0.0593	0.0424
_IRSS_443	-0.0852	0.0253	-3.3700	0.0010	-0.1348	-0.0357
_IRSS_444	-0.0365	0.0257	-1.4200	0.1550	-0.0869	0.0138
_IRSS_445	-0.0865	0.0277	-3.1200	0.0020	-0.1408	-0.0322
_IRSS_446	-0.0409	0.0272	-1.5000	0.1320	-0.0943	0.0124
_IRSS_447	-0.0494	0.0281	-1.7500	0.0790	-0.1045	0.0058
_IRSS_448	-0.0738	0.0251	-2.9400	0.0030	-0.1230	-0.0246
_IRSS_449	-0.0458	0.0272	-1.6800	0.0930	-0.0992	0.0076
_IRSS_450	-0.0254	0.0278	-0.9200	0.3590	-0.0798	0.0290
_IRSS_451	-0.0452	0.0272	-1.6600	0.0970	-0.0986	0.0082
_IRSS_452	-0.0490	0.0255	-1.9200	0.0540	-0.0990	0.0009
_IRSS_453	-0.0541	0.0271	-1.9900	0.0460	-0.1073	-0.0009
_IRSS_454	-0.0258	0.0251	-1.0300	0.3030	-0.0750	0.0233
_IRSS_455	-0.0623	0.0241	-2.5800	0.0100	-0.1096	-0.0150
_IRSS_456	-0.0177	0.0251	-0.7100	0.4800	-0.0669	0.0315
_IRSS_457	-0.1165	0.0270	-4.3200	0.0000	-0.1694	-0.0636
_IRSS_458	-0.0648	0.0257	-2.5300	0.0120	-0.1151	-0.0145
_IRSS_459	-0.0074	0.0250	-0.2900	0.7680	-0.0564	0.0417
_IRSS_460	-0.0318	0.0261	-1.2200	0.2230	-0.0830	0.0194
_IRSS_461	-0.0830	0.0260	-3.1900	0.0010	-0.1340	-0.0319
_IRSS_462	-0.0990	0.0310	-3.1900	0.0010	-0.1598	-0.0382
_IRSS_463	0.0105	0.0244	0.4300	0.6670	-0.0373	0.0583
_IRSS_464	-0.0337	0.0253	-1.3300	0.1830	-0.0833	0.0159
_IRSS_465	-0.0561	0.0248	-2.2600	0.0240	-0.1046	-0.0075
_IRSS_466	-0.0192	0.0253	-0.7600	0.4500	-0.0688	0.0305
_IRSS_467	-0.0104	0.0262	-0.4000	0.6920	-0.0617	0.0410
_IRSS_468	-0.0904	0.0256	-3.5400	0.0000	-0.1405	-0.0403
_IRSS_469	-0.1064	0.0240	-4.4200	0.0000	-0.1535	-0.0592

_IRSS_470	-0.0329	0.0251	-1.3100	0.1900	-0.0821	0.0163
_IRSS_471	-0.0775	0.0255	-3.0500	0.0020	-0.1274	-0.0276
_IRSS_472	-0.0748	0.0259	-2.8900	0.0040	-0.1256	-0.0241
_IRSS_474	-0.0610	0.0252	-2.4200	0.0150	-0.1103	-0.0117
_IRSS_475	-0.0496	0.0263	-1.8900	0.0590	-0.1011	0.0020
_IRSS_476	-0.0739	0.0339	-2.1800	0.0290	-0.1404	-0.0074
_IRSS_477	-0.0061	0.0253	-0.2400	0.8100	-0.0558	0.0436
_IRSS_478	-0.0552	0.0262	-2.1100	0.0350	-0.1065	-0.0039
_IRSS_479	-0.0715	0.0262	-2.7200	0.0060	-0.1229	-0.0200
_IRSS_480	-0.0430	0.0258	-1.6700	0.0960	-0.0936	0.0076
_IRSS_481	-0.0553	0.0247	-2.2400	0.0250	-0.1037	-0.0069
_IRSS_482	-0.0559	0.0241	-2.3200	0.0200	-0.1031	-0.0087
_IRSS_483	-0.0767	0.0299	-2.5700	0.0100	-0.1353	-0.0181
_IRSS_484	-0.0183	0.0269	-0.6800	0.4980	-0.0710	0.0345
_IRSS_485	-0.0647	0.0242	-2.6700	0.0080	-0.1122	-0.0172
_IRSS_486	-0.0691	0.0251	-2.7500	0.0060	-0.1184	-0.0199
_IRSS_487	-0.0145	0.0252	-0.5700	0.5650	-0.0638	0.0349
_IRSS_488	-0.0608	0.0250	-2.4300	0.0150	-0.1098	-0.0118
_IRSS_489	-0.0883	0.0242	-3.6400	0.0000	-0.1358	-0.0408
_IRSS_490	-0.0358	0.0273	-1.3100	0.1900	-0.0894	0.0178
_IRSS_491	-0.0658	0.0255	-2.5800	0.0100	-0.1159	-0.0158
_IRSS_492	-0.1125	0.0278	-4.0500	0.0000	-0.1669	-0.0580
_IRSS_493	-0.1045	0.0345	-3.0300	0.0020	-0.1721	-0.0368
_IRSS_494	-0.0519	0.0256	-2.0300	0.0430	-0.1020	-0.0018
_IRSS_495	-0.0212	0.0261	-0.8100	0.4180	-0.0724	0.0300
_IRSS_496	-0.0001	0.0248	0.0000	0.9980	-0.0488	0.0486
_IRSS_497	-0.0705	0.0288	-2.4500	0.0140	-0.1269	-0.0140
_IRSS_498	-0.0161	0.0250	-0.6400	0.5210	-0.0651	0.0330
_IRSS_500	-0.0477	0.0254	-1.8800	0.0610	-0.0976	0.0022
_IRSS_501	-0.0848	0.0295	-2.8800	0.0040	-0.1425	-0.0270
_IRSS_502	-0.1489	0.0334	-4.4600	0.0000	-0.2144	-0.0835
_IRSS_503	-0.0169	0.0241	-0.7000	0.4830	-0.0643	0.0304
_IRSS_504	-0.0020	0.0251	-0.0800	0.9380	-0.0511	0.0472
_IRSS_505	-0.0379	0.0282	-1.3500	0.1780	-0.0931	0.0173
_IRSS_506	-0.1019	0.0270	-3.7700	0.0000	-0.1548	-0.0490
_IRSS_507	0.0087	0.0267	0.3300	0.7430	-0.0436	0.0611
_IRSS_508	-0.0388	0.0257	-1.5100	0.1310	-0.0891	0.0116
_IRSS_509	-0.1299	0.0285	-4.5500	0.0000	-0.1858	-0.0740
_IRSS_510	-0.0170	0.0264	-0.6400	0.5200	-0.0688	0.0348
_IRSS_511	0.0125	0.0243	0.5200	0.6060	-0.0352	0.0602

_IRSS_512	-0.0345	0.0242	-1.4200	0.1540	-0.0820	0.0130
_IRSS_513	-0.0653	0.0258	-2.5300	0.0120	-0.1160	-0.0146
_IRSS_514	-0.0269	0.0262	-1.0300	0.3050	-0.0783	0.0245
_IRSS_515	-0.0612	0.0266	-2.3000	0.0210	-0.1133	-0.0091
_IRSS_516	-0.0606	0.0245	-2.4700	0.0130	-0.1086	-0.0126
_IRSS_517	-0.0474	0.0323	-1.4700	0.1430	-0.1107	0.0160
_IRSS_518	-0.0179	0.0267	-0.6700	0.5030	-0.0703	0.0345
_IRSS_519	-0.0014	0.0278	-0.0500	0.9590	-0.0560	0.0531
_IRSS_520	-0.0630	0.0250	-2.5200	0.0120	-0.1119	-0.0141
_IRSS_521	-0.0611	0.0254	-2.4000	0.0160	-0.1110	-0.0112
_IRSS_522	-0.0541	0.0271	-1.9900	0.0460	-0.1073	-0.0009
_IRSS_523	0.0039	0.0261	0.1500	0.8810	-0.0472	0.0550
_IRSS_524	-0.0598	0.0273	-2.1900	0.0290	-0.1133	-0.0062
_IRSS_525	-0.0778	0.0259	-3.0100	0.0030	-0.1286	-0.0271
_IRSS_526	-0.0282	0.0259	-1.0900	0.2750	-0.0789	0.0225
_IRSS_527	-0.0846	0.0251	-3.3700	0.0010	-0.1338	-0.0353
_IRSS_528	-0.0512	0.0253	-2.0200	0.0430	-0.1007	-0.0016
_IRSS_529	-0.0407	0.0272	-1.5000	0.1340	-0.0939	0.0126
_IRSS_530	-0.0461	0.0277	-1.6600	0.0960	-0.1004	0.0082
_IRSS_531	-0.0171	0.0252	-0.6800	0.4960	-0.0665	0.0322
_IRSS_532	-0.0166	0.0252	-0.6600	0.5120	-0.0660	0.0329
_IRSS_533	-0.0250	0.0272	-0.9200	0.3590	-0.0783	0.0284
_IRSS_534	0.0351	0.0269	1.3000	0.1920	-0.0177	0.0879
_IRSS_535	-0.1948	0.0285	-6.8400	0.0000	-0.2506	-0.1390
_IRSS_536	-0.0370	0.0258	-1.4300	0.1520	-0.0876	0.0137
_IRSS_537	0.0019	0.0247	0.0800	0.9370	-0.0466	0.0504
_IRSS_538	-0.0245	0.0261	-0.9400	0.3490	-0.0757	0.0268
_IRSS_539	-0.0656	0.0250	-2.6200	0.0090	-0.1146	-0.0166
_IRSS_540	-0.0738	0.0258	-2.8600	0.0040	-0.1245	-0.0232
_IRSS_541	-0.0676	0.0249	-2.7200	0.0070	-0.1163	-0.0189
_IRSS_542	-0.0150	0.0257	-0.5800	0.5610	-0.0654	0.0355
_IRSS_543	-0.0542	0.0259	-2.0900	0.0370	-0.1051	-0.0034
_IRSS_544	-0.0819	0.0249	-3.2900	0.0010	-0.1307	-0.0330
_IRSS_545	-0.0635	0.0295	-2.1500	0.0310	-0.1212	-0.0057
_IRSS_546	-0.0865	0.0301	-2.8700	0.0040	-0.1455	-0.0275
_IRSS_547	-0.0761	0.0262	-2.9100	0.0040	-0.1275	-0.0248
_IRSS_548	-0.1182	0.0339	-3.4900	0.0000	-0.1846	-0.0517
_IRSS_549	-0.1024	0.0290	-3.5300	0.0000	-0.1592	-0.0456
_IRSS_550	-0.0369	0.0284	-1.3000	0.1940	-0.0926	0.0188
_IRSS_551	-0.0419	0.0241	-1.7400	0.0830	-0.0893	0.0054

_IRSS_552	-0.1285	0.0254	-5.0500	0.0000	-0.1784	-0.0787
_IRSS_553	-0.0187	0.0254	-0.7300	0.4630	-0.0685	0.0311
_IRSS_554	-0.0596	0.0243	-2.4500	0.0140	-0.1073	-0.0120
_IRSS_555	-0.0410	0.0274	-1.5000	0.1340	-0.0947	0.0126
_IRSS_556	-0.0309	0.0266	-1.1600	0.2450	-0.0831	0.0212
_IRSS_557	-0.0617	0.0250	-2.4600	0.0140	-0.1108	-0.0126
_IRSS_558	0.0796	0.0321	2.4800	0.0130	0.0166	0.1426
_IRSS_559	-0.0470	0.0255	-1.8400	0.0650	-0.0969	0.0030
_IRSS_560	-0.0371	0.0289	-1.2800	0.1990	-0.0938	0.0196
_IRSS_561	-0.0465	0.0252	-1.8400	0.0660	-0.0960	0.0030
_IRSS_562	-0.0198	0.0248	-0.8000	0.4250	-0.0683	0.0288
_IRSS_563	-0.0038	0.0269	-0.1400	0.8890	-0.0566	0.0491
_IRSS_564	-0.0474	0.0256	-1.8500	0.0640	-0.0975	0.0027
_IRSS_565	-0.0181	0.0240	-0.7600	0.4500	-0.0651	0.0289
_IRSS_566	-0.0653	0.0241	-2.7100	0.0070	-0.1125	-0.0181
_IRSS_567	0.0099	0.0278	0.3600	0.7210	-0.0445	0.0644
_IRSS_568	-0.1029	0.0270	-3.8100	0.0000	-0.1559	-0.0500
_IRSS_569	-0.0615	0.0261	-2.3600	0.0180	-0.1125	-0.0104
_IRSS_570	-0.0803	0.0282	-2.8500	0.0040	-0.1355	-0.0250
_IRSS_571	-0.0430	0.0262	-1.6400	0.1000	-0.0944	0.0083
_IRSS_572	-0.0336	0.0266	-1.2600	0.2060	-0.0857	0.0185
_IRSS_573	-0.0260	0.0255	-1.0200	0.3070	-0.0760	0.0240
_IRSS_574	-0.0153	0.0243	-0.6300	0.5280	-0.0630	0.0323
_IRSS_575	-0.0598	0.0274	-2.1900	0.0290	-0.1134	-0.0062
_IRSS_576	-0.0054	0.0251	-0.2100	0.8300	-0.0547	0.0439
_IRSS_577	-0.0943	0.0250	-3.7700	0.0000	-0.1433	-0.0452
_IRSS_578	-0.0297	0.0257	-1.1500	0.2490	-0.0801	0.0207
_IRSS_579	-0.0395	0.0265	-1.4900	0.1350	-0.0914	0.0124
_IRSS_580	-0.0415	0.0276	-1.5100	0.1320	-0.0956	0.0125
_IRSS_581	-0.0066	0.0248	-0.2700	0.7900	-0.0552	0.0420
_IRSS_582	-0.0870	0.0278	-3.1300	0.0020	-0.1415	-0.0324
_IRSS_583	-0.0708	0.0316	-2.2400	0.0250	-0.1326	-0.0089
_IRSS_584	-0.0217	0.0277	-0.7800	0.4330	-0.0760	0.0326
_IRSS_585	0.0053	0.0241	0.2200	0.8250	-0.0419	0.0526
_IRSS_586	-0.0500	0.0268	-1.8600	0.0620	-0.1027	0.0026
_IRSS_587	-0.0288	0.0247	-1.1700	0.2430	-0.0772	0.0196
_IRSS_588	-0.1786	0.0315	-5.6700	0.0000	-0.2403	-0.1168
_IRSS_589	-0.0422	0.0249	-1.7000	0.0900	-0.0909	0.0066
_IRSS_590	0.0177	0.0250	0.7100	0.4780	-0.0312	0.0667
_IRSS_591	-0.0603	0.0245	-2.4600	0.0140	-0.1083	-0.0123

_IRSS_592	-0.0199	0.0242	-0.8200	0.4100	-0.0674	0.0275
_IRSS_593	-0.0197	0.0259	-0.7600	0.4460	-0.0704	0.0310
_IRSS_594	-0.0512	0.0259	-1.9700	0.0480	-0.1020	-0.0003
_IRSS_595	-0.0008	0.0251	-0.0300	0.9750	-0.0501	0.0485
_IRSS_596	-0.0449	0.0256	-1.7600	0.0790	-0.0951	0.0052
_IRSS_597	-0.0841	0.0276	-3.0500	0.0020	-0.1381	-0.0301
_IRSS_598	-0.0614	0.0272	-2.2600	0.0240	-0.1147	-0.0082
_IRSS_599	-0.0488	0.0274	-1.7800	0.0750	-0.1025	0.0050
_IRSS_600	-0.0252	0.0259	-0.9700	0.3310	-0.0760	0.0256
_IRSS_601	-0.0532	0.0251	-2.1200	0.0340	-0.1025	-0.0040
_IRSS_602	-0.0999	0.0280	-3.5700	0.0000	-0.1548	-0.0451
_IRSS_603	-0.0508	0.0257	-1.9800	0.0480	-0.1011	-0.0005
_IRSS_604	-0.0183	0.0262	-0.7000	0.4850	-0.0696	0.0330
_IRSS_605	-0.0907	0.0281	-3.2300	0.0010	-0.1458	-0.0357
_IRSS_606	-0.0641	0.0251	-2.5500	0.0110	-0.1134	-0.0148
year_2003	-0.0023	0.0041	-0.5700	0.5710	-0.0103	0.0057
year_2004	-0.0178	0.0039	-4.6000	0.0000	-0.0254	-0.0102
year_2005	-0.0198	0.0031	-6.3000	0.0000	-0.0259	-0.0136
year_2006	-0.0080	0.0032	-2.5000	0.0120	-0.0142	-0.0017
year_2007	(dropped)					
qtr_1	-0.0008	0.0020	-0.3800	0.7040	-0.0047	0.0032
qtr_2	0.0147	0.0022	6.7900	0.0000	0.0104	0.0189
qtr_3	0.0365	0.0020	18.2400	0.0000	0.0326	0.0404
qtr_4	(dropped)					
_cons	-0.9123	0.5763	-1.5800	0.1130	-2.0419	0.2174

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